Childhood Adversity Among Adolescent Mothers and its Intergenerational Consequences

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Abstract

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Childhood adversity affects the majority of children in the United States, with as many as 67% of children reporting some type of psychological trauma associated with adversity by age 16. While not predictive of maladaptive behavioral and physical health outcomes, childhood trauma has certainly become a consistent precursor to conditions across the life-course that range from depression to posttraumatic stress disorder to pro-inflammatory adult disease. The perinatal period, or the time from conception through 18 months postpartum, is a unique opportunity to better address adversity and its psychological repercussions for the health and wellbeing of childbearing individuals and their offspring. However, the relationship between childhood adversity, perinatal mood and anxiety disorders, and maternal postpartum functioning needs further investigation to truly understand whether adversity could play a role in the etiology of perinatal mental health conditions. This quantitative dissertation comprises three papers which examine the nature of childhood adversity among adolescent mothers, examines the relationship between childhood adversity and perinatal depression, and finally examines the relationship between childhood adversity and both early mother-infant attachment and postpartum parenting

stress. Collectively, the papers find that (1) childhood adversity can be characterized into three latent classes of trauma typologies; (2) childhood adversity is associated with postpartum depression, even when accounting for prenatal depression; (3) childhood adversity is associated with postpartum maternal stress but not early mother-infant attachment. Childhood adversity appears to play a significant role in the etiology of perinatal mood and anxiety disorders among adolescent mothers and affects a subsequent generation via postpartum parenting stress. Preventing childhood adversity could be instrumental in alleviating perinatal mood and anxiety disorders for a portion of childbearing individuals.

CHAPTER 1

Trauma, Mental Health, and the Perinatal Period

Introduction

I remember sitting in a flimsy hospital gown at the end of an examination table, about six months into my first pregnancy, balancing the Edinburgh Postnatal Depression Scale (EPDS) on my knees. I had handed this exact measure out to probably hundreds of pregnant and postpartum individuals during my time as a clinical social worker in St. Louis, and this was my first time taking it as a mom-to-be. The scale includes 10 questions and asks about feelings of levity ("I have been able to laugh and see the funny side of things"; "I have looked forward with enjoyment to things"), guilt ("I have blamed myself unnecessarily when things went wrong"), anxiety ("I have been anxious or worried for no good reason"; "I have felt scared or panicky for no very good reason"; "Things have been getting on top of me"), sadness ("I have been so unhappy that I have had difficulty sleeping"; "I have felt sad or miserable"; "I have been so unhappy that I have been crying"), and urges for self-harm ("The thought of harming myself has occurred to me") in the past week. I sat with my pen hovering over the form, unsure of how I wanted to answer. It was May 2020, and we were three months into the first COVID-19 lockdown. I had recently come to terms with the fact that my family would never see me pregnant, nor would they likely be present for the birth of my first child. I was also extremely fortunate to have a comfortable home from which to work, a job that could accommodate remote work indefinitely, and a partner with a stable job and income. It had been an easy pregnancy, a desired pregnancy, and my husband and I were both enjoying preparing for this baby. So all in all, my answers to each of the questions were relatively mild, and I scored myself in the non-

clinical range. My OB came in, glanced at my form, told me it looked like things were going well, and we went on with the rest of the appointment.

What that form didn't capture – and what I thought about frequently because of my clinical background – was my life history leading up to this pregnancy. It didn't capture the fact that I had battled for most of my life with obsessive-compulsive disorder, and that I knew one of the biggest risk factors for me during the postpartum period could be intrusive thoughts relating to myself or my baby. It didn't capture my history of disordered eating, which – although it had been relatively resolved for some years before I became pregnant – was combining with my gym closure, the loss of my fitness community, and my rapidly changing body to plant some seeds of doubt and worry. It didn't ask about the quality of my relationship with my partner, my social support system, or my relationship with my parents – all of which would have a huge impact on my emotional experience during pregnancy and postpartum. Conversely, I knew that my positionality afforded a number of privileges. My whiteness in particular meant that I had rarely been exposed to any type of mistreatment within the medical system, and that I had access to resources like generational wealth that I could use to mitigate the impact of my mental health history. I also did not have a trauma history or a childhood that included chronic exposure to toxic stress. I noticed myself being distracted for the remainder of that OB appointment as I thought about all the things left unsaid, and thinking about all the other pregnant people who have been asked to fill out this form. I wondered about what was left unsaid for them as well.

The EPDS is one of the standard depression scales that the American College of Obstetricians and Gynecologists recommends each childbearing individual receive at least once during their pregnancy and once postpartum. Depression is a leading complication of childbirth, with as many as 1 in 7 childbearing individuals experiencing it during the perinatal period.

Depression is known to affect not only the childbearing individual, but also their children, making it an important target to prevent harm to two generations. However, screening is still not universally carried out despite ACOG's recommendation. Even clinics that do carry out routine depression screenings are rarely connected to mental health agencies that could facilitate a timely and affordable referral for pregnancy-specific mental health concerns. Needless to say, considerable barriers still exist when it comes to depression care during the perinatal period. However, focusing on depression alone comes at the expense of a broader understanding of the impact that trauma and mental health history can have during this time.

This dissertation is about a more holistic approach to perinatal mental health: one that is trauma-informed, sensitive to the lifetime history of the childbearing individual, and provides enhanced support to the parent and their child during the postpartum period.

Trauma and the Development of Posttraumatic Stress Disorder

The evolution of current conceptualizations of trauma and stress begins in large part with the addition of the diagnosis posttraumatic stress disorder (PTSD) in 1980 with the third edition of the Diagnostic and Statistical Manual of Mental Disorders (U.S. Department of Veteran Affairs, 2016). Published by the American Psychiatric Association (APA), the DSM delineates symptom clusters corresponding to various mental illnesses. PTSD consists of intrusive symptoms, arousal symptoms, dissociative symptoms, cognitive distortions, and avoidance behaviors, and was predicated on an instance in which a person feared for their own life or the life of someone very important to them (APA, 2013). Clinical researchers developed various interventions to treat PTSD, many of which were studied (largely among middle-class white men – see: McClendon, Dean, & Galovski, 2020; Grau, Kusch, Williams, Loyo, Zhang, Warner, & Wetterneck, 2021) repeatedly, eventually given the designation of an evidence-based practice,

and still exist today as effective and reliable treatments for PTSD. The three most utilized evidence based practices – prolonged exposure therapy (PE), cognitive processing therapy (CPT), and eye-movement desensitization and reprocessing therapy (EMDR) – were designed to treat this conceptualization of trauma (Cukor, Olden, Lee, & Difede, 2010). In other words, these treatments were designed primarily to address a person who had witnessed one or more discrete instances of traumatic events, in which they had feared for their life.

The emergence of PTSD gave language, within the disciplines of psychiatry, psychology, and social work, to the phenomenon of lasting effects of acute experiences of trauma. Bowers and Yehuda wrote,

> Before the advent of this diagnosis, there was a gap in the psychiatric and stress literature with respect to the conceptualization of chronic effects of trauma…Awareness of PTSD led the scientific and lay public to understand that trauma exposure leaves enduring marks, even if those include positive and transformative effects, as well as mental health symptoms, the emergence of maladaptive cognitions, personality, and other behavioral changes. (2016, p. 233)

While PTSD allowed for a broader narrative around the relationship between acute traumatic events and lasting behavioral, cognitive, and emotional responses to these events, critics both within and outside the disciplines of psychiatry, psychology, and social work called into question the prevailing definition of trauma. Formulated largely in response to the massive numbers of veterans returning from the Vietnam War with severe emotional and behavioral symptoms, the working conceptualization of trauma in the United States was that of a white, male war veteran. Further, women and others who identified as members of disenfranchised communities and who came forward with their own trauma histories have historically been

labeled ‘neurotic’, ‘delinquent’, or ‘deviant’, rather than traumatized (Herman 1997). Critics have since argued for a broader working definition of trauma that includes familial and community-wide experiences of trauma rather than an individualized experience (Evans-Campbell, 2008). The individual subjectivity of trauma has therefore resulted in constructivist approaches to understanding not only what constitutes trauma, but also who defines trauma.

As awareness and education around PTSD grew, it turned out that trauma affected BIPOC adults (Himle, Baser, Taylor, Cambell, & Jackson, 2009), adult women (Tolin & Foa, 2008), and adult members of the LGBTQ2S community (Roberts, Austin, Corliss, Vandermorris, & Koenen, 2010) at collectively higher rates than white, male-identifying veterans. As we learned more about the prevalence of PTSD among these groups, we also understood the different types of trauma that resulted in long-term psychological harm. Indigenous scholars wrote about historical trauma and intergenerational trauma and how the collective experience of colonization and oppression had resulted in identical psychological symptoms as someone who had narrowly survived the Vietnam war (Brave Heart, Chase, Ellkins, & Altschul, 2011). BIPOC activists, researchers, and community members raised awareness about the trauma and toxicity that accompanies inhabiting a racist society (Carter, 2007). Increasing numbers of women survivors spoke out about their experiences of physical and sexual abuse – both within and outside the context of romantic partnerships – and how this also resulted in PTSD. One feminist scholar, Judith Herman, wrote extensively about women’s sexual abuse experiences, and uncovered evidence that the majority of Sigmund Freud’s female patients had in fact suffered not from neuroses but from severe sexual molestation beginning at a young age (Herman, 1997).

Even considering the incredible burden trauma has among the adult population in the US, currently the largest proportion of trauma-exposed individuals in the United States is children

(SAMHSA, 2019). Although trauma can exact long-lasting psychological repercussions at any age, children are particularly vulnerable to trauma due to the developing brain. *Toxic stress* emerged as a construct that pertains to sustained exposure to stressful or aversive stimuli, and has since been extensively studied in children (The National Scientific Council on the Developing Child, 2012). Exposure to toxic stress or trauma in childhood has been shown to have distinct neurobiological consequences, particularly for the Limbic-Hypothalamic-Pituitary-Adrenal (LHPA) Axis. The LHPA axis plays a central role in the body's response to stress, affecting a number of hormones that impact the secretion of cortisol (De Bellis & Zisk, 2014). Findings have also been inconsistent in regards to the extent of childhood trauma's impact on various neurobiological systems, indicating that environmental stimuli interacts with an individual's underlying genetic and neurobiological architecture differently (De Bellis, 2001). To further illustrate this phenomenon, children have consistently been found to be particularly resilient following a trauma exposure in the event that they are supported and nurtured consistently by a caregiver or loved one (McLaughlin, Colich, Rodmann, & Weissman, 2020). In the words of Jonson-Reid and Wideman, "A risk of negative outcome is not the same as certainty that a child so exposed will develop behavioral or emotional difficulties" (2017, p. 479). This understanding of resilience has followed from the theorizing of psychological scholars such as Dante Cicchetti, who defined the construct of multifinality as it relates to ontogeny, risk, and resilience: "In this regard…multifinality, which posits that a single component may act differently depending on the organization of the system in which it operates" (Cicchetti & Rogosch in Cicchetti & Toth, 1997, p. 318). Preventing and intervening with trauma among children therefore becomes a significant priority, given both their vulnerability and also their resiliency and ability to 'bounce back' and evade long-term psychological harm given the right support and nurturance.

Several factors have made it difficult to address childhood trauma. For one, the evidence-based treatments available for childhood trauma were developed from their adult counterparts and therefore still primarily rely on the conceptualization of trauma as one or more discrete events in which the child feared for their life. More recent innovations in child trauma interventions include evidence for treatments such as child parent psychotherapy (CPP) and fostering healthy futures (FHF), which adhere less rigidly to the PTSD definition and framework. A second factor complicating treatment for childhood trauma is inconsistency in both how it is defined and how it has been measured. Currently, 'childhood trauma' is nearly synonymous with the now famous Adverse Childhood Experiences (ACEs) Questionnaire that was developed following an epidemiological study through Kaiser Permanente in 1998 (Felitti, Anda, Nordenberg, Williamson, Spitz, Edwards, & Marks, 1998). While the ACEs have been crucial in propelling childhood trauma into a public health spotlight and identifying various early life stressors as risk factors that can implicate emotional and behavioral repercussion across the life course, there has been growing concern about their relatively narrow definition of childhood trauma. Among its largest critiques includes the fact that none of the 10 items on the ACEs questionnaire address trauma related to social inequity, racism, or oppression (McEwen & Gregerson, 2019).

Irrespective of the working definition of trauma, one aspect of trauma that has become increasingly apparent is its ability to transcend generations. Intergenerational trauma, first understood and studied by Indigenous researchers, has gained considerable traction within the scientific community in the past five years. In her account of historical trauma and the American Indian/Alaska Native (AIAN) community, Evans-Campbell described,

> The concept of historical trauma has served both as a description of trauma responses among oppressed peoples and a causal explanation for them. Associated historical events tend to be profoundly destructive at a physical and/or emotional level and are generally experienced by many people in a community…Previous scholars have suggested that the effects of these historically traumatic events are transmitted intergenerationally as descendants continue to identify emotionally with ancestral suffering (Brave Heart, 1999a, 1999b). (Evans-Campbell, 2017, pp. 320-321).

In this way, intergenerational trauma is transmitted through storytelling and a shared identification with a disenfranchised group. Evans-Campell argued that a core component of historical trauma includes violence purposefully enacted by a privileged or majority group: "This third characteristic is critical to the definition of historical trauma…many of these events are not only human initiated and intentional but also fall under the category of genocide" (2017, p. 321). These experiences, passed down through narratives, result in symptoms that have been described previously in this paper as often being implicated following chronic exposure to trauma: emotional and behavioral dysregulation, altered responses to fear, risk-taking behaviors, and so forth. The minority stress model, a related model adapted by Ilan Meyer, has been adapted to describe historical trauma among African Americans and other oppressed groups within the U.S.:

> The minority stress model suggests that the cumulative effect of these stressors leads to health impairment. Harrell (2000) suggested at least six different types of race-related stressors that racial minorities could face: race-related life events, vicarious racism experiences, daily racism microstressors, chronic-contextual stress, collective experiences

of racism, and the transgenerational transmission of group traumas. (Coleman 2016, p. 565)

The type of research produced by scholars such as Evans-Campbell and Coleman attempts to elucidate less-visible traces of oppression and adversity; while maladaptive health outcomes such as cardiovascular disease and decreased longevity have been demonstrated to co-occur within minority populations (e.g. Purnell, Camberos, & Fields, 2015), the emotional and behavioral repercussions of systemic oppression prove more elusive to measure.

Another facet of intergenerational trauma has focused on the way various environmental events interact with our underlying genetic makeup in a way that differentially blunts or potentiates the expression of our genes. Known as epigenetics, this concept balances the effects of nature and nurture and is theorized to be a major factor in inter-individual differences in outcomes following stressful environmental events. Existing research has attempted to illuminate these environmental and epigenetic mechanisms; for instance, a prior study found that the existence of a specific genetic polymorphism increased the likelihood of developing a psychiatric disorder following trauma exposure in childhood (Kim-Cohen, Caspi, Taylor, Willliams Newcombe, Criag, & Moffitt, 2006). Similarly, a recent meta-analysis found that a genetic polymorphism moderated the likelihood of developing a mental health disorder following childhood physical abuse (Klengel, Mehta, Anacker, Rex-Haffner, Pruessner, Pariante…& Nemerroff, 2013). These two papers have examined gene-environment influences within one generation, but other research has argued that environmental stressors in the parent generation are carried over and manifest in various emotional or behavioral difficulties in offspring generations. Numerous association studies have noted the association between maternal childhood trauma and risk for behavior problems in young children (Lyons-Ruth. Block, 1996;

Records, 2007; Lang, Garstein, Rodgers, & Lebeck, 2010). The mechanisms by which this happens remain difficult to disentangle, although epigenetic changes may account for some aspect of this phenomenon (Su, D'Arcy, & Meng, 2020). Regardless of the exact mechanism driving these associations, research to date has shown that trauma has ways to get 'under the skin' and exact psychological repercussions in the offspring of the individual who was exposed to the trauma in the first place. This ability to transcend generations makes prevention and intervention not only a social justice priority but also a public health emergency.

Trauma and the Perinatal Period

Given children's unique vulnerability and resiliency to trauma and its repercussions, along with the phenomenon of intergenerational trauma, the perinatal period poses a uniquely ideal time to intervene and address trauma in a way that reaches two generations simultaneously and pays particular attention to protecting early infant mental health and development. Perinatal mental health has historically focused on addressing postpartum depression for the health and wellbeing of both childbearing individuals and their infants. We are just recently increasing our awareness to the role of unresolved trauma in perinatal mental health. In some ways, this has been studied explicitly (see: Trinetti, Bind, Sawyer, & Pariante, 2020). In other ways, trauma seems to lurk underneath the surface of more prominent perinatal mental health conditions such as perinatal suicidality (Orsolini, Valchera, Vecchiotti, Tomasetti, Iasevoli, Fonaro,..&Bellantuono, 2016) and perinatal substance use disorders (Whiteman, Salemi, Mogos, Cain, Aliyu, & Salihu, 2014). This dissertation takes into consideration the history of trauma and its treatment-related challenges by focusing on heterogeneity within a particular sub-group of childbearing individuals: adolescent mothers.

Current Study

This dissertation is comprised of three aims which are divided into three papers. Collectively, they describe the impact that childhood trauma has on perinatal mental health among adolescent mothers. The first project will identify latent classes of teenage mothers who report childhood trauma experiences. The second project will test hypotheses about whether maternal trauma exposure acts as a more accurate indicator for a postpartum mood disorder when compared with antenatal depression. Finally, the third project will compare the predictive validity of the latent sub-groups on offspring internalizing and externalizing behavior with a regression analysis linking a composite trauma score with offspring internalizing and externalizing behavior. We hypothesize that the more specific latent sub-groups will provide a nuanced risk profile for early childhood internalizing and externalizing disorders that is an improvement upon a regression analysis that simply uses a summed index of traumatic events as a predictor. All three projects will utilize the Young Women and Child Development Study (YCDS), which is a longitudinal study following teenage mothers and their children in the Northwestern United States (Oxford, Lee, & Lohr, 2010). The aims are described below:

Paper One Aim: Describe the heterogeneity of responses to trauma exposure by identifying latent classes of trauma-exposed teenage mothers with variation in psychological trajectories. This aim will add to the literature on trauma and psychopathology in that it will help identify the contexts that may either buffer or exacerbate trauma's effects, thereby informing preventive intervention efforts.

Paper Two Aim: Examine the nature of the relationship between childhood trauma exposure and perinatal depression to understand trauma's role in the etiology of perinatal depression. This aim addresses the importance of understanding the relationship between

significant environmental adversities and their relationship with perinatal mood and anxiety disorders (PMADs).

Paper Three Aim: Examine the nature of the relationship between childhood trauma exposure and early mother-infant attachment. While previous studies have established an association between maternal childhood trauma and offspring behavior, this aim examines specifically on early childhood attachment and the ways in which trauma could in a parent generation could exact effects on a subsequent generation via differences in maternal attachment behavior.

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CHAPTER 2

Heterogeneity of Childhood Trauma Among Adolescent Mothers

Abstract

Adolescent childbearing has been associated with risk factors pertaining to both the health of the childbearing individual and their baby. Less is known about the extent and impact of childhood trauma on adolescent childbearing individuals. Further, childhood trauma has historically been conceptualized in a way that emphasizes individual experience – for example, being pushed, grabbed, or slapped by a parent or another adult in the home - at the expense of larger structural factors – for example, repeated exposure to community violence. This is despite evidence that chronic exposure to these stressors can manifest in psychological and behavioral symptoms that are similar to those found in trauma and stressor-related disorders.

Aims: This paper characterizes childhood trauma experiences of adolescent mothers.

Methods: This paper uses latent class analysis to examine the heterogeneity of childhood trauma exposure (birth to age 18) among a sample of 495 adolescent mothers. This sample utilized the Young Women Childhood and Development Study (YCDS), a twenty-year longitudinal study examining the outcomes of adolescent mothers and their children. Childhood trauma experiences were collected from baseline (Wave 1) through the year-five follow-up (Wave 5).

Results: The latent class analysis resulted in an optimal 3-class solution that were described as: the Parental Stressors Class, the Violence and Abuse Class, and the Invalidating Environment Class.. Fifty-six percent of the sample experienced partner violence prior to age 18, and another 56% experienced some form of community violence.

Discussion: While previous literature on childhood trauma has made distinctions among physical abuse, sexual abuse, and neglect, this analysis reveals the need for a broader approach to childhood trauma that is sensitive to structural-level factors. Implications stemming from this analysis include advocating for a broader conceptualization of trauma, enhancing trauma-informed care for adolescent childbearing individuals, and including maternal trauma as a significant consideration in perinatal mental health care.
Keywords: adolescent childbearing, childhood trauma, perinatal mental health

CHAPTER 2

Heterogeneity of Maternal Childhood Adversity

Introduction

Teen pregnancy in the United States has been steadily declining over the past twenty years, with the most recent estimated prevalence at 16.7 teen births per 1,000 females (Centers for Disease Control and Prevention, 2021). While this is a substantial improvement over the rate in 1991 (61.8 teen births per 1,000 females), the US continues to have the highest rate of teen pregnancies among countries with similar GDPs (CDC Morbidity and Mortality Weekly Report, 2011; Jeha, Usta, Ghulmiyyah, & Nassar, 2015). Combined with the fact that the US also leads its peer countries in the maternal morbidity and mortality rate – in fact, in 2018 its rate of 17.4 deaths per 100,000 live births was more than twice the rates of other developed countries – teen pregnancy is a vulnerable time for both childbearing individuals and their babies (Tikkanen, Gunja, FitzGeralld, & Zephyrin, 2020). Support for perinatal individuals and their offspring is more important than ever, as the US has seen a surge in the maternal mortality rate and health disparities related to maternal and infant outcomes in the wake of the COVID-19 pandemic (Johnson, 2022). The larger sociopolitical context of reproductive health rights in the US also plays a significant role in negatively affecting the health and wellbeing of childbearing individuals and their children, with Texas continuing to ban abortions past six weeks gestation (prior to when many childbearing individuals know they are even pregnant) and Mississippi seeking to overturn *Roe v. Wade* by the end of the Supreme Court's term in June 2022 (Center for Reproductive Health Rights, 2022). In summary, while the US has seen improvement in the teen pregnancy rate over the past twenty years, this statistic seems to hang precariously in the mix of what is becoming an increasingly sinister context for perinatal health.

Teen pregnancy has, in turn, been associated with a number of complications for both the childbearing individual and their infant. An observational study of approximately 13,000 adolescent pregnancies found increased risk for maternal outcomes including pre-eclampsia and cesarean section (Karatasli, Kanmaz, Inan, Budak, & Beyan, 2019). In contrast, a large epidemiological study across 19 birthing centers in the US found a decreased risk for cesarean section but increased risk for preterm delivery, postpartum hemorrhage, and blood transfusion among adolescent mothers (Kawakita, Wilson, Grantz, Landy, Huang, & Gomez-Lobo, 2016). Teen pregnancy has also been connected with adverse infant outcomes including preterm birth, low birth weight, and low 5-minute Apgar scores (Karatasli et al., 2019). A global study on adolescent pregnancy corroborated these findings, noting increased risk for adverse perinatal outcomes including preterm birth and low birth weight, but not increased risk for adverse maternal outcomes (Althabe, Moore, Gibbons, Berrueta, Goudar, Chomba…&McClure, 2015). Finally, a retrospective population-based study in Scotland found second pregnancies – but not first pregnancies – among adolescent mothers to be at increased risk for stillbirth and premature delivery after removing common confounders in adolescent pregnancy such as teenage smoking (Smith & Pell, 2001). Findings from countries outside the US should be interpreted with caution, given the impact structural and political differences – such as universal health insurance, quality of health insurance, and so forth – have on maternal and perinatal outcomes. Nevertheless, there appear to be additional health-related concerns for adolescent childbearing individuals when compared with their adult counterparts.

One aspect of support for adolescent childbearing individuals includes attention to lived experiences, such as childhood trauma, that may be impacting their prior or current mental health, behavior, and feelings about the pregnancy. Maternal childhood trauma has been widely

studied as a risk factor for various adverse perinatal outcomes, including postpartum depression, impacted maternal-infant attachment, and maternal substance abuse (Su et al., 2020; Langevin, Marshall, & Kingsland, 2021; Fatehi, Miller, & Fatehi, 2021; Plant, Pawlby, Pariante, & Jones, 2018). Developmentally, adolescence is a sensitive time in which the ability to regulate emotion increases, but also can be an inflection point where the beginnings of other mental health concerns or difficulties in emotion regulation emerge (Silvers, 2021; Zeman, Cassano, Perry-Parrish, & Stegall, 2006). External stressors such as a new pregnancy or the repercussions of a traumatic experience may take a greater toll on the health and mental health of adolescent childbearing individuals when compared with their adult counterparts. This is reflected in the literature: adolescent mothers have been found to have elevated rates of postpartum depression, lower rates of breastfeeding initiation or duration, higher rates of poverty, and lower perceived self-efficacy with regards to parenting when compared with adult mothers (Uzun, Orhon, Baskan, & Ulukol, 2013; Motil, Kertz, & Thotathuchery, 1997; Chen, 1996).

A body of literature that was particularly active in the early 1990s - when adolescent pregnancy was at peak rates in the US – found associations between childhood trauma and various adolescent sexual health behaviors, including adolescent pregnancy. A prospective cohort study in 1996 found sexual abuse and neglect to be predictive of adolescent promiscuity and prostitution but not pregnancy (Widom & Kuhns, 1996). A more recent paper examined substantiated allegations of child sexual abuse among adolescents and compared their pregnancy and birthing outcomes to a matched cohort of adolescents without a history of abuse; researchers found adolescents in the child abuse group to be 4.6 times more likely to become pregnant as an adolescent, and 5.26 times more likely to have a complication during their pregnancy (Fortin-Langelier, Daigneault, Achim, Vezina-Gagnon, Guerin, & Frappier, 2019). An epidemiological

study examining health behaviors among adolescents in the early 1990s similarly found child sexual abuse to be highly correlated with adolescent pregnancy involvement among both male and female participants (Saewyc, Magee, & Pettingell, 2004). In addition to literature linking childhood sexual abuse to adolescent pregnancy, more recent studies have examined the association between ACEs and adolescent pregnancy as ACEs grew into the mainstream working 'definition' of childhood trauma. These papers identified a dose-response relationship between increasing numbers of ACEs and adolescent pregnancy rates (Hillis, Anda, Dube, Felitti, Marchbanks, & Marks, 2004; Flaviano & Harville, 2021; Hughes, Bellis, Hardcastle, Sethi, Butchart, Mikton…&Dunne, 2017). While there appears to be an association between childhood trauma and adolescent pregnancy, the recommendations for intervention and prevention have seemed to focus – at least from a public health perspective –on increasing access to long acting reversible contraception (LARCs) and other forms of birth control. Access to contraception is undeniably important; however, more could be done from a prevention and intervention angle to address the psychological ramifications of childhood trauma and the role this plays in subsequent sexual health behaviors and sexual victimization.

The current study adds to the field of childhood trauma and adolescent pregnancy by examining the breadth of traumatic experiences among adolescent mothers. Rather than pre-defining childhood trauma by focusing either on previously established child abuse risk factors (e.g., childhood sexual abuse) or utilizing prior childhood trauma questionnaires, such as the ACEs Questionnaire, this paper examines the extent of a variety of traumatic experiences among adolescent mothers. Some researchers – particularly those who have been critical of the ACEs' focus on individual-level traumatic experiences at the expense of structural-level factors, such as racism and discrimination (Smith, Monteux, & Cameron, 2021; Lacey & Minnis, 2020; Walsh,

2019; Walsh, McCartney, Smith, & Armour, 2019) – have applied this approach when examining the impact of childhood trauma on adult pregnancy outcomes (Hall, Beauregard, Rentmeester, Livingston, & Harris, 2019). However, this expanded conceptualization of trauma and traumatic stress has not been applied to research with pregnant adolescents. A person-centered approach such as LCA affords the opportunity to examine the potential utility of an expanded definition of trauma among adolescents and characterize the ways in which different types of trauma self-segregate into different categories. This study further adds to the literature on trauma and adolescent pregnancy in its emphasis on prevention and intervention directed towards trauma and traumatic stress in early childhood and adolescence.

Aims

The current study utilizes a person-centered approach, latent class analysis, to examine the heterogeneity of childhood trauma among a sample of 495 adolescent childbearing individuals. We hypothesize that this analysis may reveal variations in trauma history and experience that are inclusive of larger structural-level factors (poverty, food insecurity, housing insecurity) that contribute to a more holistic conceptualization of childhood trauma.

Methods

Data

This study used data from the Young Women and Child Development Study (YCDS), which was funded by the National Institute on Drug Abuse (NIDA) in 1987. The aims of the original study included: characterizing the onset of drug use, school failure, aggression, interpersonal violence, and delinquency among the children of adolescent mothers; conceptualize various profiles with regard to behavior and development for both the mothers and their children; examine the role of executive functioning in parenting practices and maternal behavior; and

examine the study findings in context of four different models of intergenerational transmission. The total sample includes 495 women who were recruited at some point during their first pregnancy as an adolescent (13 years and older). These women and their children were followed longitudinally for approximately fifteen years. The combined YCDS sample was recruited in two 'cohorts', one in 1987 and another in 1992. This study utilized data from the baseline, Wave 2, Wave 3, Wave 4, and Wave 5 interviews across both cohorts in order to capture adolescents' responses until they 'aged out' of childhood at 18 years old.

Sample

The analytical sample for this study used all 495 participants in the YCDS sample. The sample was recruited in various agencies and settings serving adolescent childbearing individuals in three urban counties in the Northwestern US. Enrollment eligibility included: being younger than 18 at the time of enrollment, planning to continue the pregnancy and parent the child, and being English-speaking. Demographic data for this sample are included in Table 1.

Measures

Sources of Childhood Trauma and Traumatic Stress

This analysis adopted an inclusive definition of childhood trauma and traumatic stress that encompassed the following domains: parental poverty, parental substance abuse, emotional abuse, sexual abuse, severe food insecurity, partner violence, community violence, severe housing insecurity, parental death, parental divorce, foster care involvement, parental arrest, sibling death, and family cohesion. Responses to each of the trauma items were collected up through each participant's 18th birthday, since this is the age at which a person gains legal status as an adult in the US. Several of these domains map directly onto the ten items assessed in the ACEs questionnaire (Felitti, Anda, Nordenberg, & Williamson, 1998). While all of the

constructs in the Felitti ACEs are represented in the variables selected for this study, two of the constructs (partner violence and mental health burden) referred to the mothers' own experiences of partner violence and mental health, rather than their experience of partner violence and mental health issues among their parents or caregivers. Another widely used childhood trauma assessment is the Childhood Trauma Questionnaire (CTQ; Bernstein, Ahluvalia, Pogge, & Handelsman, 1997). As with the ACEs Questionnaire, the domains in the variables selected for this study overlap with the seven items on the CTQ. The only item on the CTQ that is not represented in the variables for this study pertains to severe illness or injury prior to age 18.

The 'novel' childhood trauma items included in this study were: parental poverty, food insecurity, partner violence, community violence, housing insecurity, sibling death, and family cohesion. Poverty, food insecurity, and housing insecurity were included to draw attention to the growing understanding of how socioeconomic stress can leave lasting detrimental effects on children's neurodevelopment (Luby, 2015), as well as the development of children's stress response systems (Engel & Gunnar, 2020). Socioeconomic status has also been correlated with higher ACEs (Walsh, McCartney, Smith, & Armour, 2019), prompting some critics to advocate for a broader definition of childhood adversity as well as an examination of how individual traumatic experiences tend to aggregate or cluster (Lacey et al., 2020). Parental substance abuse was included in addition to parental alcoholism to account for the connection between parental substance abuse and childhood trauma (Taplin, Saddichha, Li, & Krausz, 2014; Staton-Tindall, Sprang, Clark, Walker, & Craig, 2013; Parolin, Simonellli, Mapelli, Sacco, & Cristofalo, 2016). While partner violence is an entire sub-field within trauma, violence, and abuse, it is rarely conceptualized as a form of childhood adversity since much of the research on partner violence consists of adult samples. A majority of the literature devoted to partner violence and childhood

trauma focuses on the intergenerational associations between exposure to partner violence in the parent generation and childhood trauma in the offspring generation (e.g., Holt, Buckley, & Whelan, 2008). Partner violence that occurs between an adolescent and their partner is typically conceptualized as 'dating violence' rather than partner violence or childhood trauma and has been somewhat of a distinct field of research and practice (e.g., O'Keeffe, Brockopp, & Chew, 1986). However, given the age overlap between the constructs of dating violence in adolescence and childhood adversity, it seemed fitting to include partner violence as a measure of childhood trauma in this sample. Exposure to partner violence among the probands' parents was not included as it was not measured. Community violence or neighborhood violence has been increasingly studied in its overlap with the original ACEs. A recent confirmatory factors analysis of trauma victimization in childhood resulted in a two-factor solution that contrasted the original ACEs with structural-level factors such as neighborhood violence and poverty (Afifi, Salmon, Garces, Struck, Fortier, Tallieu,…& MacMillan, 2020). The Philadelphia ACE Task Force, which was originally convened to determine the extent of the original ACEs in Philadelphia, grew into a project focused on developing what is now the Philly ACEs and encompasses community-level adversity, including community violence (Pachter, Lieberman, Bloom, & Fein, 2017). Sibling death during childhood or adolescence was included along with parent death as the impact of a sibling death has been studied alongside parent death in terms of its impact on the emotional wellbeing and behavior of the surviving child (Dowdney, 2008; Dickens, 2014; Paris, Carter, Day, & Armsworth, 2009). Finally, I included a measure of family cohesion from the Family Support Scale to supplement the item on emotional abuse by parents (Dunst, Trivette, & Cross, 1986). This decision was made in the wake of a burgeoning literature describing the long-term effects of what has been termed 'traumatic invalidation'. This term has been used to refer to

chronic patterns of invalidation both within family systems and when existing in oppressive cultures (Cardona, Madigan, & Sauer-Zavala, 2021; Salter, 2012; Schreiber & Veileux, 2022). It "occurs when an individual's environment repeatedly or intensely communicates that the individual's experiences, characteristics, or emotional reactions are unreasonable and/or unacceptable" (Boston Child Study Center, 2021). In this paper, traumatic invalidation was measured via family cohesion only, as there was not data available on experiences of racism and other forms of oppression.

Variable Selection

Each of the following variables was identified through the codebooks associated with both Cohorts 1 and 2. Variables were only selected for inclusion in the current study if identical questions were asked in both Cohorts 1 and 2 and during the same Wave, or follow-up interview. Because I was interested in childhood trauma exposure, which has been previously operationalized as trauma that occurs between birth and age 18, data was harvested for each participant up through Wave 5 at which the median participant age was 17.5.

Parent welfare was assessed in the baseline interview for both Cohort 1 and 2. It was measured by maternal self-report regarding whether or not her parents had received welfare money over the past year (0 = no, 1 = yes). It is important to note that welfare receipt during this time – in the early 1990s – was prior to Bill Clinton's sweeping welfare reform act that did away with Aid to Families with Dependent Children in favor of Temporary Assistance for Needy Families (TANF). Of particular significance to this study was the fact that, in 1990, barely more than 50% of unmarried mothers were entering the workforce, child poverty was hovering at around 20%, and the number of Americans receiving welfare was among the highest in the past forty years (The Washington Post, 2016).

Parental substance abuse was measured in several ways. In the baseline interviews for Cohort 1 and 2, mothers self-reported on their parents' current rates of alcohol use from "Never" (1) to "3 or more drinks a day" (8). These scales were collapsed into a binary variable for heavy alcohol use where "3 or more drinks a day" was coded as yes/1 and anything less was coded as no/0. Similarly, mothers self-reported on their parents' current illicit drug use (0 = "No"; 1 = "Used to but quit"; 2 = "Yes, sometimes"; 3 = "Yes, often"; 4 = "Don't know, but you think so"; 5 = "Don't know, but you don't think so"; 9 = "Don't know"). These were collapsed into a binary variable where "Yes, sometimes" or "Yes, often" was coded as yes/1 and anything else was coded as no/0. Finally, both Cohorts answered questions about parents' alcoholism during their childhood: "Did you ever live with an alcoholic parent or parent figure?" (0=no; 1=yes).

Emotional abuse came from one of the items from the Family Support Scale, which was a likert scale of 14 items administered at the baseline interview and at each follow-up interview. Answering "Strongly agree" or "Somewhat agree" to item 12 ("As long as I can remember, my parents have put me down") for any of the baseline or follow-up interviews through Wave 5 was coded as yes/1, or was otherwise coded as no/0.

Sexual abuse was ascertained as mothers' self-report of rape at any point prior to the baseline interviews ("Have you ever been forced to have sexual intercourse against your will? That is, you had no other choice and had to do it?" 0=no; 1=yes).

Food insecurity was asked at the Wave 3 through Wave 5 interviews for Cohorts 1 and 2. Mothers completed a 5-point likert scale in response to the prompt, "How often in the past 3 months have you not had enough money to afford the kind of food you should have?". Answers were transformed to a binary variable where "Fairly often" or "Very often" were coded as 1/yes,

while anything else was 0/no. Answering affirmatively to any of the Wave 3 through Wave 5 interviews resulted in a 1/yes.

Partner violence was ascertained retrospectively at the Wave 6 interview for both Cohorts 1 and 2; mothers were asked to complete the Conflict Tactics Scale, which is a series of 7 items that their partner may or may not have engaged in ever, excluding the previous year – in other words, at any point up through age 18 (Caulfield & Riggs, 1992). Mothers answered whether their partners had ever (1) "Threaten[ed] to hit or throw something at you"; (2) "Actually throw something at you"; (3) "Push, grab, shove, or slap you"; (4) "Kick, bite or hit you with a fist or object"; (5) "Beat you up, choke or burn you"; (6) "Threaten you with a knife or gun"; (6) "Use a knife on you or fire a gun at you". An affirmative answer to any of the 7 items was coded as yes/1.

Community violence was ascertained via mothers' self-report on 14 different items spanning mothers' personal experiences ("Please tell me if any of these things have happened to you"): running away from individuals, groups, or gang members; beaten up or mugged; attacked or stabbed with a knife; being shot or shot at with a gun; witnessing these same things happening to a family, friend, or someone close to the mother, or witnessing these things happen to a stranger in the mothers' presence. These items were asked retrospectively about lifetime exposure to these events at Time Point 9 (5 year follow-up) for Cohort 1, and Time Point 3 (1 year follow-up) for Cohort 2. An affirmative answer to any of the 14 items was coded as yes/1.

Housing insecurity was ascertained at the Wave 3 follow-up. Mothers were asked about governmental financial assistance with expenses for housing in the past 3 months (0=no/1=yes).

Parental death was ascertained via maternal self-report over whether or not they had lost a mother, father, or parent figure through death during their childhood (1=yes/0=no).

Parental divorce was ascertained via maternal self-report on whether their parents had divorced or broken up during their childhood (1=yes/0=no).

Foster care involvement was ascertained via maternal self-report on whether they had spent any time in foster care during their childhood (1=yes/0=no).

Parental arrest was queried at the baseline interview as well as each of the follow-up interviews via the Life Events Scale; mothers answered "Have any of the following things happened to you during the past year?". An affirmative answer to item 6 ("Parent was arrested") was coded as 1/yes.

Family cohesion also came from the Family Support Scale administered at the baseline and each of the follow-up interviews. Answering "Strongly Agree" or "Somewhat Agree" to item 1 ("Our family members feel very close to each other") for any of the baseline or follow-up interviews through Wave 5 was coded as yes/1, or was otherwise coded as no/0.

Covariates

This analysis followed a three-step approach for including covariates in the overall model (Asparouhov & Muthén, 2014). LCAs are increasingly including covariates in the development of the latent class forumulation to show sensitivity to the ways that demographic characteristics might vary across classes. For this analysis, I selected the covariates race/ethnicity, education level at Wave 5, and occupation status at Wave 5. Race, education, and occupation are common covariates among maternal health and mental health research (Rahman, Surkan, Cayetano, Rwagatare, & Dickson, 2013; Crear-Perry, Correa-de-Araujo, Lewis Johnson, McLemore, Neilson, & Wallace, 2021; Firoz, Chou, Von Dadelszen, Agrawal, Vanderkruik, Tuncalp,… & Say, 2013). Maternal age (Cohort 2 mean age 16.6 at Wave 1; Cohort 1 mean age 6.6 at Wave 1)

was excluded as a covariate due to the similar age group in this sample. Gender was excluded as a covariate as all participants identified as female.

Analysis

This study utilized a person-centered methodological approach, latent class analysis (LCA), to examine the heterogeneity of traumatic experiences among this cohort of adolescent mothers. LCA is a fitting choice for this analysis because it is important to understand how a broader conceptualization of trauma might coalesce into different groupings or categories, and what that might mean as they relate to other longer-term outcomes down the road. This could also lead to different recommendations in terms of preventive intervention. The two principal aims of LCA are to reduce the complexity of a dataset to a smaller number of unobservable latent classes and to assign class membership to each object in the dataset (Bartholomew, Steele, & Moustaki, 2008).

The formula for an LCA is given by an N by p data matrix of values of p binary variables, x1…xp, taking the values of 0 or 1 for n objects (individuals). Latent class model for binary variables with J latent classes makes following assumptions:

i) n individuals are a random sample from the population and each individual in the population belongs to one of the J latent classes

ii) probability of giving a positive response to an item is the same for all individuals in the same class

iii) given the latent classes to which an individual belongs, its responses to different items are conditionally independent

Pi(ij) = Pr(xi=1 given j) is the probability that a randomly selected person from class j will answer positively to item i, for (i=1…p; j=1…, J). Pi(ij) is the conditional probability of a positive response to item i, given membership of class j.

This analysis followed Muthén & Muthén's (2012) guidance for conducting an LCA with binary latent class indicators using M*plus* v.8.2 (Muthén & Muthén, 1998-2017). The parent data from the original dataset were all stored in SPSS; the selected variables were harvested from each of the first 5 interviews (for both Cohorts 1 and 2) and then merged into a new dataset in R (Venables & Smith, 2019) to perform data cleaning and set the dataset up to complete the LCA in M*plus*. The same variables from each wave were aggregated so that a positive response for any given respondent between baseline and the Wave 5 follow-up was stored as a '1' (yes). Of the 19 variables selected for analysis, 3 (food scarcity, financial strain, and medical financial strain) were originally stored as categorical variables and were recoded to binary to be consistent with the majority of the variables. Crosstabs were generated for each of the variables to examine the distribution of the data as well as any missing variables. An initial LCA was run in R using the poLCA package (Linzer & Lewis, 2011) in order to examine preliminary results. The analysis was then re-run in M*plus* in order to better handle instances of missing data, since poLCA listwise-deletes instances of missing data and M*plus* utilizes full-information maximum likelihood estimation (Schafer & Graham, 2002). I followed procedures described by Weller, Bowen, & Faubert (2020) – within the framework of Muthén & Muthén's LCA procedures for M*plus* – to guide class solution, include covariates, and validate the model.

Posterior Probabilities

As a part of this analysis, I retained the posterior probabilities for all individuals in the sample in order to set up the methods for the two subsequent analyses in the dissertation. The

procedure for calculating the posterior probabilities for use in regression analyses followed methodology laid out in Bray et al, 2014. N(j) is the proportion of the population in latent class j or the probability that a randomly selected individual from the population belongs to latent class j (aka the prior probability). The posterior probability for individuals in a data matrix are given by the following formula:

$$\Pr(\text{individual is in class } j \text{ given } x1,\ldots xp) \qquad (j=1,\ldots,J)$$

Conducting the LCA

I performed a series of iterative analyses, beginning with a 1-class solution and increasing to a 5-class solution, to examine the fit of the data to each model. I performed each analysis using M*plus*' default estimators, but did re-run the LCA with the final selected model (the 3-class model) with the number of random restarts increased to 500 and optimization increased to 20 to ensure consistent results and that a maximum rather than local likelihood was reached. Each subsequent class solution was compared with the previous solution to identify the best-fitting model; model quality began to decline with the 4-class model, and this trend continued with the 5-class model, suggesting that a 3-class model was the best fit to the data. The three-class model was chosen based on a combination the Vuong-Lo-Mendell-Rubin adjusted likelihood ratio test (Lo, Mendell, & Rubin, 2001), the bootstrapped likelihood ratio test (McLachlan & Peel, 200), the Bayesian information criterion (BIC), and interpretability of a 3-class model. BICs are commonly reported in LCAs as an overall indication of fit, with lower BICs indicate a better fit of the data to the model (Nylund, Asparouhov, & Muthén, 2007).

I examined supplemental model fit statistics to ensure the 3-class model was the ideal choice for this data. The 3-class model had the best entropy (7.2), which is considered to be a helpful statistic in considering the overall fit of the data (Muthén & Muthén, 2008).

After selecting the 3-class solution as the final model, I retained the posterior probabilities based on the previously mentioned formula and then fixed the measurement parameters of the LCA model by including the covariates in the model after the latent classes had been formed. Maternal race/ethnicity, maternal education at Wave 5, and maternal occupation status at Wave 5 were included as covariates using the three-step approach described by Asparouhov and Muthén**.**

Results

Based on multiple-fit statistics and the theory around childhood trauma and traumatic stress guiding this study, a 3-class solution was selected as the best fit of the data to the model. Table 2 presents sample characteristics and responses. The sample for this study was majority white (57%), with only about 38% having earned a GED or high school diploma by the age of 18, and 23% employed by age 18.

It is important to note the prevalence of trauma within this sample. Consistent with previous research on physical and sexual abuse and adolescent pregnancy, the current sample contains high rates of physical abuse (57%) and sexual abuse (29%) (Madigan, Wade, Tarabulsy, Jenkins, & Shouldice, 2014). Both socioeconomic factors – financial strain and financial worry – were also highly prevalent in this sample, with the full sample reporting rates of 53% and 66%, respectively. Finally, I expanded the definition of trauma to include domains of emotional trauma, community violence, and partner violence consistent with literature demonstrating equivalent traumatic symptom burden among individuals exposed to these stressors when compared with individuals recovering from a 'Criterion A' index trauma (Criterion A: Exposure to actual or threatened death, serious injury, or sexual violence in one (or more) of the following ways: Directly experiencing the traumatic event(s); Witnessing, in

person, the event(s) as it occurred to others; Learning that the traumatic event(s) occurred to a close family member or close friend; Experiencing repeated or extreme exposure to aversive details of the traumatic event(s)) in the DSM-V. Each of these factors was highly prevalent in the full sample. Partner violence – which, again, was ascertained not as a measure of experiencing partner violence among the adolescent mother's parents but rather instances of partner abuse directed at the adolescent mother prior to age 18 – was a staggering 56% in this sample. Community violence – a reflection of structural violence that has historically been underrepresented in trauma literature – was prevalent at the exact same rate of 56%. Emotional abuse was ascertained as emotional abuse coming specifically from the adolescent mother's parents and was present in fully half of the sample at a rate of 51%.

Table 2.
Sample Characteristics of Adolescent Mothers (Ages 13-18), $N = 495$

	Percent, (Number)
Sociodemographics	
Race/ Ethnicity	
Black / African American	25.05% (124)
American Indian	6.46% (32)
Asian / Pacific Islander	4.24% (21)
White	56.57% (280)
Other	7.68% (38)
Hispanic	10.71% (53)
GED/HS Diploma	38.38% (190)
Employed	23.03% (114)
Trauma Indicator Variables	
Latent Class 1: Parental Stressors	
Parent welfare	37.98% (188)
Parent alcohol use	13.33% (66)
Parent drug use	21.41% (106)
Alcoholic parent	42.22% (209)
Parent arrest	16.16% (80)
Parent death	12.53% (62)
Parental divorce	49.29% (244)
Foster care	19.19% (95)
Latent Class 2: Violence & Abuse	
Rape	29.29% (145)

Physical abuse	57.37% (284)
Partner violence	55.76% (276)
Community violence	55.76% (276)
Housing insecurity	44.24% (219)
Financial stress	66.26% (328)
Food insecurity	23.23% (115)
Financial strain	52.93% (262)
Latent Class 3: Invalidating Environment	
Emotional abuse	50.91% (252)
Family cohesion	29.70% (147)

Table 3 presents the statistics associated with the various models. The BIC for the 3-class solution (10726.84) was comparable to the 2-class solution (10724.57). A BIC with a difference smaller than 10 is considered negligible in terms of one being favorable over the other (Nyylund, Asparouhov, & Muthen, 2007). Further, while the Lo-Mendell Rubin Likelihood Ratio Test (LMR-LRT) for the 2 class solution (0.0002) was smaller than that of the 3 class solution (0.2030), the bootstrapped likelihood ratio test (BLRT) for both solutions was significant at the $p < 0.000$ level, which indicates that the 3 class solution was still an acceptable fit over the 2 class solution judging by the BLRT in conjunction with the BIC (Nylund et al., 2007). Given these findings and the theoretical interpretation of a 3 class versus a 2 class solution, I opted for a 3 class solution as the final solution. The characteristics of the 3-class model fit are shown in Figure 1 and described below.

The first class, consisting of 46.9% of the sample, was characterized by high drug and alcohol use among the adolescent mothers' parents, and was labeled the 'Parental Stressors' class. Mothers within the Parental Stressors class were more likely to have a parent with heavy alcohol use when compared with mothers in the second class (Violence and Abuse) or mothers in the third class (Invalidating Environment). Similarly, mothers in this class were much more likely to have parents with illicit drug use or parents who had been determined to be 'alcoholics'.

This class also seemed to represent the highest rates of other forms of stressors related to the adolescent mothers' parents. Specifically, this class contained higher rates of parents who had died, were reliant on welfare, had been divorced, had been arrested, or who had lost temporary custody of the adolescent mother at some point during their childhood. There were some traumatic experiences that were highly represented within this class, but at rates very similar to the Violence and Abuse class. For instance, both the Parental Stressors class and Violence and Abuse class demonstrated similar rates of physical abuse, partner violence, and financial strain. In each of these cases, this may be somewhat attributable to the high prevalence among the entire sample for all three of these traumatic experiences. It is also important to note that physical abuse was ascertained as physical abuse from the mothers' parents and not from her partner or other individuals outside the family of origin. While the Parental Stressors class demonstrated comparable rates to the Violence and Abuse class for the three aforementioned variables, they were much more likely to have experienced these types of traumatic experiences when compared with the Invalidating Environment class.

The Violence and Abuse class was the smallest class at 19.19% of the total sample. As previously mentioned, this class contained rates of financial strain, partner violence, and physical abuse at similar rates to the Parental Stressors class. This class was unique in that mothers within this group were much more likely to have experienced rape or community violence. Although this class was termed 'Violence and Abuse', this class also represented some of the highest rates for socioeconomic concerns relating to the mothers themselves (rather than their parents). Specifically, mothers in this class were more likely to experience financial stress, housing insecurity, and food insecurity. Given that financial strain appeared to heavily impact mothers in both the Parental Stressors and Violence and Abuse classes, this second class seemed to be

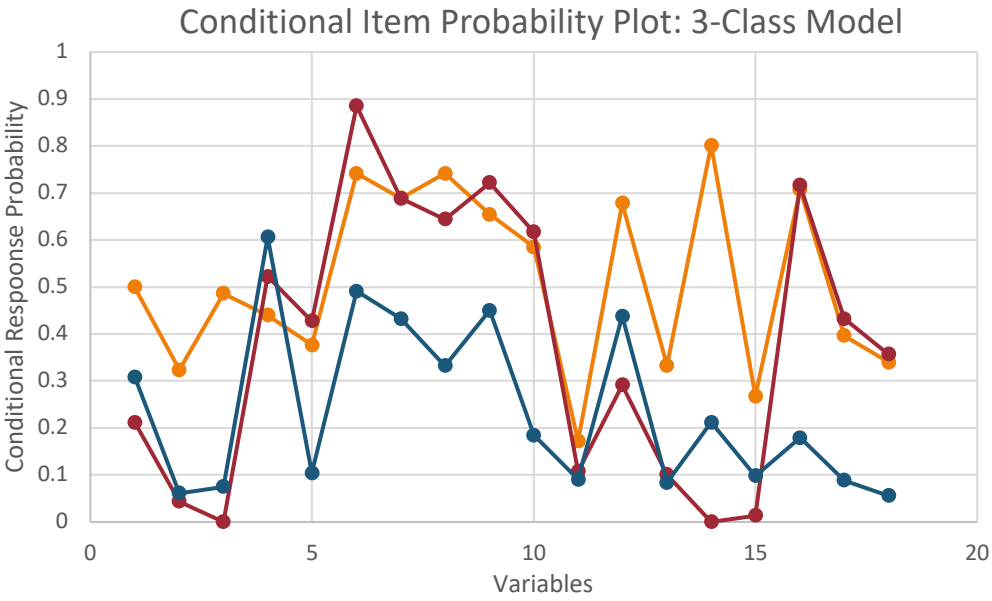
distinct in that the trauma variables highly represented in this group pertained more to the mothers' lived experiences rather than traumatic events that had to do with their parents.

The final class, the Invalidating Environment, contained 34.04% of the total sample. While this class contained a larger proportion of the sample compared to the previous class, it seemed to be unique only in a couple trauma domains. This class was the most likely to experience emotional abuse and have the lowest rates of family cohesion. Emotional abuse was ascertained as emotionally derogatory behavior from the adolescent mothers' parents specifically. This class was therefore representative of mothers who experienced trauma that was specific to emotional and interpersonal difficulties in their family of origin.

Table 3.
Evaluating Class Solutions and Model Fit (N = 495, 19 variables)

Models	Log-likelihood	BIC	Class counts (n, %)	Entropy	Avg Latent Class Posterior Probability (ALCPP)	LMR-LRT (p value)	Bootstrapped likelihood ratio test (BLRT, p value)
1 Class	n/a	10985.76	495	n/a	1.000	n/a	n/a
2 Class	385.277	10724.57	248, 247 (49.96)	0.658	0.891	0.0002	0.000
3 Class	121.825	10726.84	230 (46.90), 95 (19.19), 170 (34.04)	0.720	0.871	0.2030	0.000
4 Class	72.100	10778.83	76 (15.35), 89 (17.98), 145 (29.29), 185 (37.37)	0.721	0.885	0.1903	0.000
5 Class	50.26	10852.67	182 (36.77), 68 (13.74), 96	0.739	0.821	0.4261	0.2500

			(19.39), 72 (14.55), 77 (15.56)				



Note: X-axis variables: *(1) parent welfare; (2) alcohol use; (3) drug use; (4) emotional abuse; (5) rape; (6) financial stress; (7) physical abuse; (8) partner violence; (9) community violence; (10) housing insecurity; (11) parent death; (12) divorce; (13) foster care; (14) alcoholism; (15) incarceration; (16) financial strain; (17) family cohesion; (18) food scarcity*

Discussion

This study demonstrated the utility of a broader and more inclusive conceptualization of traumatic events as it pertains to the experiences of adolescent mothers in the United States. The analysis indicated a 3-class solution depicting various profiles of trauma-exposed adolescents: (1) the Parental Stressors class, characterized by adolescent mothers whose parents struggled with various personal and environmental stressors, (2) the Violence and Abuse class, characterized by adolescent mothers who primarily experienced trauma in the form of violence by partners or other non-family perpetrators, and (3) the Invalidating Environment class,

characterized by adolescent mothers who experienced emotional abuse or pervasive interpersonal difficulties in their family of origin. This study adds to the field by extending prior literature on trauma and adolescent motherhood (Lee, Gilchrist, Beadnell, Lohr, Yuan, Hartigan, & Morrison, 2017; Stargel & EAsterbrooks, 2020; Lee, Duan, Lee, Rose, Oxford, & Cederbaum, 2022; Moioli, Riva Crugnola, Albizzati, Bottini, Caiati, Chisari…&Ierardi, 2021) in its expanded conceptualization of trauma and traumatic stress. In doing so, this analysis highlighted the relative utility of inclusion of a broader classification of trauma that includes items like structural violence and traumatic invalidation.. These findings can be used to argue for an expanded definition of trauma and a conceptualization of trauma that goes beyond the 'Criterion A' trauma definition in the DSM-V.

One notable contribution of this analysis is its attention to the sheer prevalence of various types of traumatic experiences among adolescent mothers. While some forms of trauma – particularly sexual abuse and neglect – have been well-documented among this population, we found particularly high rates of emotional abuse, partner violence, community violence, and financial strain in our sample. The rate of partner violence was particularly striking, since this is rarely included in measures of childhood trauma. Our hope is that these statistics encourage researchers to include measures of partner violence, emotional abuse, and forms of structural violence when assessing childhood trauma. More research on the rates of partner violence among adolescent pregnant individuals would also help to either corroborate or moderate these findings.

A second contribution of this paper is its inclusion of structural violence and traumatic invalidation in addition to other 'Criterion A' events found in commonly used childhood trauma questionnaires such as the Adverse Childhood Experiences questionnaire or the Childhood Trauma Questionnaire. Despite a lack of representation in clinical trauma research, both

traumatic invalidation and structural violence (or other forms of oppression) can have lasting psychological and behavioral effects on individuals, and can result in symptomatology identical to posttraumatic stress disorder (Mechanic, Weaver, & Resick, 2008; Spinazzola, Hodgdon, Liang, Ford, Layne, Pynoos,…&Kisiel, 2014; Bandermann & Szymanski, 2014; Pieterse, Carter, Evans, & Walter, 2010; Reisner, White Hughto, Gamarel, Keuroghlian, Mizock, & Pachankis, 2016). The results of this LCA demonstrated the utility in this broader definition of trauma, particularly since traumatic invalidation emerged as a distinct class. This is consistent with a growing body of literature on traumatic invalidation, defined as pervasive invalidation of a person's emotional experiences that have lasting effects on the person's self-concept and functioning (Wagner, Rizvi, & Harned, 2007). The emergence of this class in the 3-class solution lends support to this burgeoning theory and emphasizes the importance of conceptualizing these types of traumatic experiences as equally pertinent when compared to other categories of violence and abuse. This paper therefore adds to a growing body of literature calling for a broader definition of trauma. It also poses important questions for how we conceptualize trauma treatment, when such a large burden of traumatic experience may in fact be structural. Currently, the three most robust evidence-based PTSD treatments (prolonged exposure therapy, cognitive processing therapy, and eye movement desensitization and reprocessing therapy) are contingent on the existence of a 'Criterion A' trauma, can be performed only when the trauma is not likely to recur, and are focused solely on the individual. A broader definition of trauma necessitates a more flexible approach to treatment – one that can encompass community, be sensitive to traumatic experiences that are pervasive and ongoing (as in the case of racism or other forms of oppression), and that focus less on one 'index' traumatic event.

These findings should be interpreted in light of the current state of affairs in the United States with regards to adolescent mental health and reproductive health rights. Fortunately, adolescent pregnancy rates have continued to decline in the U.S. since the early 1990s – although disparities in these rates persist, with the birth rates for Hispanic teens and non-Hispanic Black teens at over two times the rate for non-Hispanic white teens (Centers for Disease Control and Prevention, 2021). It is possible that the success we have seen in mitigating the overall rate of teen pregnancy in the U.S. is in jeopardy given the legislation targeted and drastically constraining abortion rights. If rates do start to increase again – or if we see a widening of the current teen pregnancy health disparities as a result of this legislation – it will be important to guard against the co-occurring structural, physical, emotional, and sexual traumas that have plagued this population. Another alarming consideration is the exponential rise of mental health challenges and suicide rates among adolescents in the U.S. Even prior to the onset of the COVID-19 pandemic, the rate of suicide among those ages 10-24 increased nearly 60% between 2007 and 2018 (Centers for Disease Control and Prevention, 2018). As of 2020, gun violence became the leading cause of death among U.S. adolescents, followed by suicide (Goldstick, Cunningham, & Carter, 2022; National Institute of Mental Health, 2022). Mental health experts cite the role of social media, the enduring consequences of the pandemic, and the existential threat of climate change as key contributors to this phenomenon (Chatterjee, 2021). In any case, attempting to cope emotionally, physically, and financially with a pregnancy on top of the considerable list of stressors currently affecting teens would be a daunting task. While suicidality was not included as part of this analysis, any research or clinical care with this population should assess for suicidal ideation and behavior since it is now such a prevalent factor for teens.

Limitations and Strengths

This study had several limitations which are worth considering when interpreting the reported results. First, while the parent study (the Young Women Child Development Study) used a prospective longitudinal design and recruited pregnant adolescents at some point during their pregnancy, some of the information reported – particularly some of the trauma variables pertaining to the adolescents' parents – was retrospective in nature. Second, all of the trauma variables used for this analysis came from self-report measures. It is possible that bias could have influenced the severity and/or validity of some of the trauma items reported by the adolescents, and the study would have been strengthened with another source that could have corroborated the adolescents' self-reported items. From a data analysis perspective, the entropy for the 3-class solution could have been strengthened. While entropy is not a diagnostic statistic used to determine the utility of a given class solution, it is a helpful metric that speaks to the cohesiveness of each individual class and the likelihood that individuals are reliably sorted into a given class (Nylund-Gibson & Choi, 2018; Weller, Bowen, & Faubert, 2020). It is possible that the entropy in an analysis like this would have been stronger if the rates of some of the trauma variables were not quite as high for the entire sample population. Finally, due to the large number of variables included in this analysis, the correlation matrix could not be calculated and reported on as part of the LCA. Multiple iterations of the LCA were run with various trauma variables collapsed or reduced – in order to decrease the number of variables in the analysis andn make a correlation matrix possible - but this did not result in an overall stronger solution which was interpretable from a theoretical perspective and more successful statistically than the 3-class solution presented here with all 18 variables. Ultimately, we believe that the strengths of this

study – which include its broad definition of childhood trauma and its attention toward the prevalence of various sources of traumatic stress in this population – outweigh the limitations.

Conclusion

This study contributes to the field of research on maternal childhood trauma by including a broad definition of sources of childhood traumatic stress, and by using a person-first methodology (LCA) to examine the ways in which these traumatic events appear to cluster among adolescent mothers. These findings are pertinent given the intersecting public health crises of adolescent mental health and maternal trauma as it pertains to rates of maternal mortality. Future directions for this research should include prevention and intervention recommendations that are sensitive to addressing trauma that is structural in nature and pervasive or enduring, rather than discrete events.

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Chapter 3

Typologies of Childhood Trauma and their Effect on Adolescent Postpartum Depression

Abstract

Perinatal depression is a leading complication of childbirth and affects adolescent childbearing individuals at greater rates than their adult counterparts. While childhood trauma has been widely associated with the occurrence of adolescent pregnancy and other sexual health risk behaviors, few studies have examined the relationship between childhood trauma, adolescent pregnancy, and perinatal depression. Studies that have examined these associations have reported inconsistent findings and tend to narrowly define childhood trauma.

Aims: This paper has two aims: (1) examine the association between maternal childhood trauma and postpartum depression at six, twelve, and eighteen months, and (2) understand the direct effect of childhood trauma on postpartum depression after accounting for the effect of prenatal depression on postpartum depression outcomes.

Methods: Using data from the Young Women Childhood and Development Study (YCDS), I completed two regression analyses linking childhood trauma to postpartum depression. Independent variables for the regression analyses included the childhood trauma categories resulting from the latent class analysis in paper 1.

Results: Probability of membership in the Parental Stressors or Violence and Abuse latent class consistently and significantly predicted increases in postpartum depression across all time points. These associations were attenuated but remained significant in the majority of cases when adding prenatal depression into the model as a covariate.

Discussion: Childhood trauma maintained a direct effect on postpartum depression outcomes, even when accounting for prenatal depression which is currently the most universally

accepted method of predicting postpartum depression. These findings indicate that attention to the trauma histories of childbearing individuals – and alleviation of the lingering emotional, social, and behavioral repercussions of these traumas - could be a powerful way of mitigating postpartum depression for adolescent mothers.

Keywords: adolescent childbearing, childhood trauma, perinatal mental health

Introduction

Mental Health and the Perinatal Period

Perinatal Mood and Anxiety Disorders (PMADs) refer broadly to depressive disorders and anxiety disorders that occur in the context of a pregnancy or through eighteen months postpartum (Meltzer-Brody & Rubinow, 2021). Perinatal depression, which is one sub-category of PMADs, is a leading complication of pregnancy, with tremendous public health burden for both childbearing individuals and their offspring (Goodman, Rouse, Connell, Broth, Hall, & Heyward, 2011; Netsi, Pearson, Murray, Cooper, Craske, & Stein, 2018). As many as 18% of childbearing individuals experience depressive symptoms and 13-15% develop a major depressive episode during pregnancy through the first three months postpartum (Goodman, 2004; Segre, O'Hara, Arndt, & Stuart, 2007). Childbearing individuals who are exposed to stressors associated with poverty and racism have also endorsed higher rates of PMADs. For example, Gavin et al. found that women who identified as Black or as Asian/Pacific Islander reported fivefold increased odds of antenatal depression compared to non-Hispanic White women, over and above sociodemographic characteristics also associated with depression risk (Gavin, Melville, Rue, Guo, Dina, & Katon, 2011). PMADs during pregnancy are associated with adverse obstetric and infant outcomes including increased risk of miscarriage, pre-term birth, low birth weight, small for gestational age babies, gestational hypertension, and preeclampsia (Grote, Bridge, Gavin, Melville, Iyengar, & Katon, 2010).

Untreated depression during pregnancy has been established as the greatest risk factor for postpartum depression and has been associated with increased risk for maternal suicide and infanticide (Bonari, Pinto, Ahn, Einarson, Steiner, & Koren, 2004; Milgrom, Gemmil, Bilszta, Hayes, Barnett, Brooks & Buist, 2008). Thus, early identification and treatment are important

for minimizing adverse impacts on mothers and their families. The American College of Obstetricians and Gynecologists (ACOG) recommends screening for depression symptoms at least once during the perinatal period (Committee on Obstetric Practice, 2015). However, this recommendation is not often met in primary healthcare settings.

PMADs and Adolescent Pregnancy

In contrast to the burgeoning advocacy, research, and innovation with regard to perinatal mood and anxiety disorders in adult childbearing individuals over the past ten years, there has been remarkably less interest in PMADs among adolescents. This may be reflective of the relative advances in the United States over the past couple of decades in reducing the overall rate of adolescent pregnancy. The research that does exist on this population is quite mixed. One study published around the time that the adolescents for the current paper were recruited for the YCDS study – a relatively more active time for research on adolescent pregnancy – was also one of the only studies to employ a case-control design and examine postpartum depression among pregnant adolescents versus depression rates among case-matched, non-pregnant teens. The researchers found no significant differences in clinical depression and depressive symptomatology between the two groups (Troutman & Cutrona, 1990). This finding is especially important given the current-day context in which adolescent mental health in the United States is a public health crisis (Rascoe & Narro, 2022). Other studies found a higher rate of postpartum depression among pregnant adolescents compared with pregnant adults (Dinwiddie, Schillerstrom, & Schillerstrom, 2017; Birkeland, Thompson, & Phares, 2005; Chen, 1996; Reid & Meadows-Oliver, 2007). However, few studies compared the adolescent mental health outcomes to mental health outcomes among non-pregnant peers. The few review papers that have been published on postpartum depression among adolescents concluded that it was difficult

to make definitive conclusions about depression in this population given the dearth of studies (Dinwiddie et al., 2017; Kleiber & Dimidjian, 2014). However, a consistent finding across all studies on adolescent pregnancy was elevated rates of postpartum depression at upwards of twenty percent, while the prevalence of postpartum depression among adults continues to hover around fourteen percent (Goodman, 2004; Birkeland et al., 2005).

Trauma, Adolescent Pregnancy, and PMADs

In contrast to the literature on postpartum depression among adolescent childbearing individuals, there has been a relatively larger number of studies focused on predictors and correlates of adolescent pregnancy. Trauma has been consistently linked to adolescent pregnancy, with previous studies demonstrating higher rates of trauma among pregnant adolescents compared to their adult counterparts (Dinwiddie et al., 2017). Childhood sexual abuse has been cited as a particularly salient risk factor (Fiscella, Kitzman, Cole, Sidora, & Olds, 1998; Stevens-Simon & Reichert, 1994; Madigan, Wade, Tarabulsy, Jenkins, & Shouldice, 2014; Stock, Bell, Boyer, & Connell, 1997). A recent study examining mediating pathways between childhood maltreatment and adolescent pregnancy found that substance use and higher pregnancy desire could be relevant factors connecting the two phenomenon; however, this study did not examine the potential role of issues such as partner violence or sexual abuse that could be related both to child maltreatment and adolescent pregnancy (Russotti, Handley, Rogosch, Toth, & Cicchetti, 2020).

A handful of studies have examined the relationship between childhood trauma, perinatal depression, and adolescent pregnancy. Results consistently found strong associations between prenatal depression and postpartum depression (Meltzer-Brody, Bledsoe-Mansori, Johnson, Killian, Hamer, Jackson…& Thorp, 2013; De Venter, Smets, Raes, Wouters, Franck,

Hanssens…& Van Den Eede, 2016). While Meltzer-Brody et al. found trauma history to be predictive of both antenatal and postpartum depression, De Venter et al. found no associations between childhood trauma and postpartum depression. These studies also tended to define childhood trauma as either broad categories of neglect, physical, or sexual abuse (Meltzer-Brody et al., 2013), or as life stressors (De Venter et al., 2016; McGuinness, Medrano, & Hodges, 2013; Niyonsenga & Mutabaruka, 2021). Other studies focused on trauma, adolescent pregnancy, and postpartum depression have operationalized trauma as traumatic birth experiences (Anderson, 2010; Fallot & Harris, 2008). The current study adds to a relatively small number of studies examining trauma and perinatal mental health among adolescent mothers, while also incorporating a broader and more inclusive definition of childhood trauma.

Aims

The current study had two aims. Aim one of this study was to examine the relationship between the maternal trauma latent classes from p aper 1 and postpartum depression at three time points (six, twelve, and eighteen months postpartum). With this aim, I hoped to address the question of whether differences in types of childhood trauma could be informative in terms of increased risk for postpartum depression. Aim two of this study was to investigate prenatal depression as a potential confounder in the relationship between childhood trauma and postpartum depression, in order to understand whether childhood trauma maintained a direct effect on postpartum depression after accounting for prenatal depression as a covariate in the regression model. In other words, Aim 2 asked the question of whether prenatal depression alone accounted for any association between maternal childhood trauma and postpartum depression, or whether the addition of maternal childhood trauma might confer increased risk for postpartum depression over and above prenatal depression.

Methods

Data

This study used data from the Young Women and Child Development Study (YCDS), which was funded by the National Institute on Drug Abuse (NIDA) in 1987. The aims of the original study included: characterizing the onset of drug use, school failure, aggression, interpersonal violence, and delinquency among the children of adolescent mothers; conceptualize various profiles with regard to behavior and development for both the mothers and their children; examine the role of executive functioning in parenting practices and maternal behavior; and examine the study findings in context of four different models of intergenerational transmission. The total sample includes 495 women who were recruited at some point during their first pregnancy as an adolescent (13 years and older) in three urban counties in the Northwestern US. Enrollment eligibility included: being younger than 18 at the time of enrollment, planning to continue the pregnancy and parent the child, and being English-speaking. These women and their children were followed longitudinally for approximately fifteen years. Data collection for Cohort 1 began in 1987 and ended in 2007, while data collection for Cohort 2 began in 1992 and ended in 2007. The study utilized data from the baseline (pregnancy), Wave 3 (six months), Wave 4 (twelve months), and Wave 5 (eighteen months) interviews for Cohort 1, and the baseline (pregnancy), Wave 2 (six months), Wave 3 (twelve months), and Wave 4 (eighteen), interviews for Cohort 2.

Sample

The analytical sample for the latent classes utilized in these analyses included all 495 participants in the YCDS sample. For more information on the formation of the latent classes, or a review of the constructs included in the formation of the latent classes, please refer to p aper 1. The two regression analyses in this paper utilized a complete case analysis approach, in which

any observations with missing data were deleted. I chose this approach over a multiple imputation approach as there were different rates of missing cases for each cohort. The analytic sample for Cohort 1 for all time points (through eighteen months postpartum) was 229 (11 missing) and 235 (20 missing) for Cohort 2, reflecting a total of 0.05% decrease of the total sample size for Cohort 1 and a 0.08% decrease of the total sample size for Cohort 2.

Measures

Childhood trauma

Childhood trauma was captured using the three latent classes resulting from the analysis in p aper 1. For more information on the trauma constructs included for the formation of the latent classes, please refer to p aper 1. The three latent classes resulting from that analysis included: the Parental Stressors class, which consisted of individuals whose trauma consisted of factors relating to their parents (e.g., parental alcoholism or substance abuse, parental incarceration, foster care, etc.); the Violence and Abuse class, which consisted of individuals whose trauma was primarily instances of rape or sexual abuse or physical abuse from their partner; and the Invalidating Environment class, which consisted of individuals whose trauma was related to emotional abuse from their parents as well as poor family cohesion.

Depression

Depression was ascertained differently across the two cohorts. Cohort 1 used thirteen items taken from the SCL-90, a 90-item self-report questionnaire adapted from the Hopkins Symptom Checklist (HSCL) that assesses a range of psychological symptoms (Derogatis, Lipman, & Covi, 1977). Previous studies that have used this subscale reported good reliability (a = 0.85; Lohr, Gill more, Gilchrist, & Butler, 1992). For a list of the thirteen depression items, see the ‘Measures’ section in the Appendix. Cohort 2 measured depression using the Center

for Epidemiological Studies Depression Scale (CES-D), which is a 20-item self-report measure about depressive symptoms in the past week (Radloff, 1977). Each of the depression questionnaires were administered during the initial interviews while the study participants were pregnant, and were subsequently administered every six months (cohort 2) or year (cohort 1) through the first three years of the child's life. The interviews were conducted by research interviewers and took place in the participants' homes.

Covariates

The three covariates used in the regression analyses include maternal age, maternal educational attainment, and employment status. Age, educational attainment, and employment status are frequently used covariates in research pertaining to maternal mental health and were therefore selected as covariates for the current study. While marital status is also a common covariate, this was excluded in the current study due to the participants' mean ages. Finally, race was not included as a covariate in order to avoid the incorrect implication that any factors associated with differences by race are due to any inherent differences based on race, rather than the downstream effects of racism. Each of the covariates was measured at the time of the baby's delivery, so that it reflected the mother's age at the time of her child's birth, the mother's educational attainment (high school diploma or GED = 1; none = 0) at the time of the baby's birth, and employment status at the time of the baby's birth (employed = 1; not employed = 0).

Analysis

The analysis for this paper consisted of a mixture model following Asparouhov and Muthén's updated protocol linking latent class analysis (LCA) results to distal variables via a three-step approach (2014). As LCAs gained in popularity, researchers sought to use the outcomes from LCAs as predictors in subsequent regressions or other types of analyses. While

this approach makes sense intuitively, the bias built into the LCA model poses unique challenges when using these results as a predictor and attempting to analyze them in conjunction with distal outcomes. Asparouhov and Muthén published a protocol in response to these challenges, which have since been themselves studied and altered by other researchers in an attempt to find ways to minimize bias when including LCA results in a larger model. This paper's three-step approach consisted of (1) performing the LCA in M*plus* using a standard approach (Muthén & Muthén, 2017); (2) fixing the model parameters and re-running the LCA, this time including covariates in the model; and (3) using the posterior probabilities as predictor variables for a series of linear regression analyses (this third step is also referred to in the literature as probability weighted regression – see Clark & Muthén, 2009 – or case-weight regression – see Kamata, Kara, Patarapichayatham, & Lan, 2018). For the linear regression models, the Invalidating Environment class – also known as Latent Class 3 – was used as the reference category both because there was no 'normative' class in the 3-class solution and because the interpretation was simplest using the Invalidating Environment class as the reference class. Performing the regression analyses with either the Parental Stressor (Latent Class 1) class or the Violence and Abuse (Latent Class 2) class resulted in both positive and negative coefficients, whereas the output using the Invalidating Environment as the reference class resulted in positive coefficients only. Therefore, the interpretation of the regression output should read, 'holding the Invalidating Environment class constant, individuals in the Parental Stressors class showed a 0.6 increase ($p < .001$) in standardized depression scores at six months postpartum'. The coefficients for the intercept are also included in the output as this is relevant to the reference category. For an example of other empirical studies that have utilized this approach, see Sacco, Bucholz, & Spitznagel, 2009, or Lanza & Rhoades, 2013. For each of the distal outcomes (6 Month

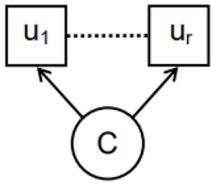
Postpartum Depression, 12 Month Postpartum Depression, and 18 Month Postpartum Depression) for Cohorts 1 and 2, two versions of the regression analyses were run: with and without a 'baseline' measure of depression during pregnancy. This was done to emphasize the unique contribution of trauma on postpartum depression while taking into account prenatal depression, which has been established as a significant risk factor for postpartum depression. Cohorts 1 and 2 were run separately as there was a higher number of missing data in Cohort 2, and this paper opted for a complete case analysis over imputation to account for missing data.. Although the cohorts were run separately, the depression scores were standardized across both cohorts to ensure similar interpretations.

A number of methodological papers have tested various procedures for incorporating LCA results into larger mixture models (Lanza, Tan, & Bray, 2013; Sinha, Calfee, & Delucchi, 2020; Weller, Bowen, & Faubert, 2020; Nylund-Gibson & Choi, 2018; Masyn, 2013). Figure 1, taken from Clark and Muthén's *Relating Latent Class Analysis Results to Variables not Included in the Analysis* (2009), presents three directed acyclical graphs (DAGs) depicting the ways in which researchers have attempted to relate latent class analysis results to other types of variables. The main approaches that have been evaluated are: treating the discrete latent classes as predictors in a model, logit-transforming each individual's posterior probability as a type of weight, using the posterior probabilities themselves as the predictors, and including the other variables in the analysis in the latent class analysis itself. Overwhelmingly, researchers have advised against using the discrete latent classes as predictors due to the error built into the formation of the latent classes themselves – and the fact that an individual typically has substantial probability of being in more than one of the latent classes (Lanza et al., 2013). According to Wellller et al. (2020), the 'one-step approach' of including all the covariates in the

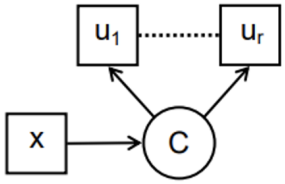
latent class analysis can be a useful way to reduce bias in the model, but only if the entropy in the original LCA (formed without the addition of the other covariates) is quite high at .80 or higher. The other drawback of this approach includes the theoretical problems inherent in including auxiliary variables as factors that could influence the formation of the latent classes themselves. Given that the entropy for this paper's LCA was .72, I employed a probability weighted regression approach. Papers that have performed Monte Carlo simulation studies contrasting the various methods have concluded that probability weighted regression is an acceptable way to relate LCA outcomes to regression models, especially in the context of lower entropy scores, and can reduce bias in regression coefficients (Kamata et al., 2018; Clark & Muthén, 2009). The main drawback of this approach is unreliable standard errors (Clark & Muthén, 2009).

Figure One

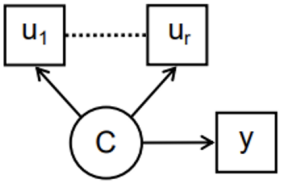
1a. Latent Class Analysis Diagram



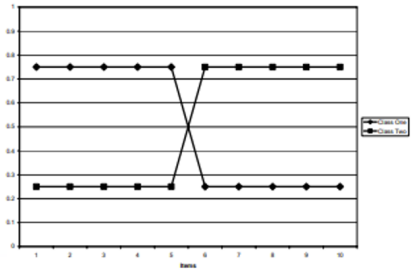
1b. Latent Class Analysis with Covariates



1c. Latent Class Analysis with Distal Outcome Diagram



1d. Crossed Profile Plot



Computing the Posterior Probabilities and Relating these to Distal Outcomes

The following statistical formulas and tables will illustrate the process of moving from the construction of the posterior probabilities following the LCA to the regression analyses. As

previously mentioned, Paper 1 resulted in a 3-class solution in which Latent Class 1 was termed the *Parental Stressors* class, Latent Class 2 was termed the *Violence and Abuse* class, and Latent Class 3 was termed the *Invalidating Environment* class. Because the entropy – which is a measure of the relative separation of each class – was moderate at .72, each individual in the sample was assigned a 'most probable class' based on the highest relative class membership calculated using the following formula:

$$P(c=k \mid u_1, u_2, \ldots, u_r) = \frac{P(c=k)P(u_1 \mid c=k)P(u_2 \mid c=k)\ldots P(u_r \mid c=k)}{P(u_1, u_2, \ldots, u_r)}.$$

In which the probability (P) of assignment into a given class is based on the observed binary variables (u), the categorical latent variable (c), and k classes. Table 1 demonstrates a handful of the posterior probabilities, along with the most likely class assignment, for Cohort 1:

Table 1

ID #	Class 1 Posterior	Class 2 Posterior	Class 3 Posterior	Assigned Class
1	0.964	0.013	0.023	1
2	0.007	0.758	0.235	2
3	0.171	0.000	0.829	3
4	0.988	0.000	0.012	1
5	0.928	0.000	0.072	1

While there are some 0-order probabilities represented in this small sample, the majority of probabilities were non-zero for each of the possible classes. As a result, using only the assigned class in a subsequent analysis would have artificially erased a great deal of error or uncertainty that is otherwise preserved when using the posterior probabilities. In keeping with protocol for probability weighted regression, these posterior probabilities were then included into the regression model as predictor variables. The standard equation for a linear regression with multiple variables is given by the following formula:

$$y = \beta_0 + \beta_1 X_1 + \ldots + \beta_n X_n + \varepsilon$$

In which y is the predicted or expected value of the dependent variable, $X_{1...}X_n$ are each of the predictor variables in the model, $ß_0$ is the y-intercept, or slope of the line, when all other variables in the equation are equal to zero, $ß_1 \ldots ß_n$ are the regression coefficients for each of the predictor variables, and E is the model error term. Therefore, the multiple linear regression equation for this analysis is:

$$\text{Postpartum depression} = ß_0 + ß_1(\text{Age}) + ß_2(\text{Education}) + ß_3(\text{Employment}) + ß_4(\text{Posterior Probabilities for Class 1}) + ß_5(\text{Posterior Probabilities for Class 2}) + ß_6(\text{Prenatal Depression}) + E$$

This analysis consisted of four linear regression models: (1) Cohort 1 regression without $ß_5$(Prenatal Depression), (2) Cohort 1 regression with $ß_5$(Prenatal Depression), (3) Cohort 2 regression without $ß_5$(Prenatal Depression), and (4) Cohort 2 regression with $ß_5$(Prenatal Depression). The cohorts were analyzed separately because Cohort 2 had a higher number of missing data, and each regression was run using complete case analysis in which observations with missing data were excluded. The final sample size for Cohort 1 was 229 (11 missing) and 235 (20 missing) for Cohort 2. The depression scales for Cohorts 1 and 2 were standardized in order to ease interpretation of the results across cohorts. Prenatal depression was added into each regression model separately for two reasons. First, prenatal depression has been established in the literature as a robust predictor for postpartum depression – which is why the current screening guidelines in clinical practice settings recommend screening for depression at least once during a person's prenatal care. Second, I wanted to investigate any residual direct effect of childhood trauma on postpartum depression outcomes, *after* accounting for the role of prenatal depression. The models therefore demonstrate a direct effect and then attenuated effect of trauma

on postpartum depression. All analyses were conducted using R 4.1.3 (R Core Team, 2017). Preliminary, exploratory tests ensured that the data met the four assumptions for multiple linear regression, and I included a gamma link function in the model as the distribution of the dependent variable (the depression scores) was right-skewed.

Results

Table 2 presents descriptive statistics of the analysis variables, excluding baseline depression rates as those scores were standardized for the purposes of the regression analysis. Cohort 1 and Cohort 2 were reported separately as the regression analyses were run separately for each cohort. For each of the cohorts, the average maternal age at baseline was 16. At the time of their pregnancy, about 20% of mothers had obtained their GED or high school diploma, as many of them were still completing their high school education. A higher proportion of mothers in Cohort 1 (31%) were employed during their pregnancy compared to a smaller proportion in Cohort 2 (16%). Across both cohorts, the most likely class assignment was Latent Class 1, or the Parental Stressors class. The second-largest most likely class assignment for both cohorts was Latent Class 3, or the Invalidating Environment class, followed by Latent Class 2, or the Violence and Abuse class. Percentages for educational attainment and employment were taken at the time of the baby's birth, or the first follow-up interview; there is a small amount of attrition reflected in the *n*'s for these covariates, and those were excluded from the analysis in keeping with a complete case analysis approach.

Table 2
Descriptive Statistics for Analysis Variables. Means and Percentages in Available Sample

Variable	*Cohort 1 (N=240)*		*Cohort 2 (N=255)*	
	n	*% or M (SD)*	*n*	*% or Mean (SD)*
Latent Class 1	240	0.53 (0.43)	255	0.41 (0.44)
Latent Class 2	240	0.21 (0.33)	255	0.16 (0.29)
Latent Class 3	240	0.26 (0.35)	255	0.26 (0.35)

Age	240	16.10 (1.01)	255	16.04 (1.02)
GED/HS diploma (1= diploma / GED)	236	20%	247	18.21%
Current job (1 = employed)	236	31%	248	15.73%

Auxiliary models

Following Clark and Muthen's auxiliary model protocol (Clark & Muthen, 2009), ANOVA tests were run to examine the baseline associations between the assigned classes and outcome variables. The results of these tests can be found in Appendix Table 2. Assigned classes were significantly associated with depression scores at baseline (Cohort 1 ($F(1, 237) = 5.583$) $p < .01$; Cohort 2 ($F(1, 251) = 10.48$, $p < .001$), postpartum depression at six months (Cohort 1 ($F(1, 234) = 12.67$, $p < .000$; Cohort 2 ($F(1, 243) = 16.58$, $p < .000$), postpartum depression at twelve months (Cohort 1 ($F(1, 233) = 27.48$, $p < .01$; Cohort 2 ($F(1, 235) = 9.114$, $p < .000$), and postpartum depression at eighteen months (Cohort 1 ($F(1, 237) = 26.77$, $p < .000$; Cohort 2 ($F(1, 235) = 10.62$, $p < .001$). The strength of the associations between the assigned classes and distal variables lends further rationale to the decision against including these variables in the formation of the latent classes themselves as part of a one-step model approach.

The results of the multiple linear regressions linking the latent class probabilities to postpartum depression at six, twelve, and eighteen months can be found in Table 3 and Table 4. For each cohort, a series of six multiple linear regressions were computed. The first three linear regressions examined the impact of the posterior probabilities for Latent Class 1 (Parental Stressors) and Latent Class 2 (Violence and Abuse) on postpartum depression at three time points, with Latent Class 3 (Invalidating Environment) as the reference category. The final three regressions examined the impact of the posterior probabilities for Latent Class 1 and 2 on

postpartum depression at three time points, with the *addition* of baseline (prenatal) depression as a covariate.

Cohort 1 Results

In Cohort 1, both trauma classes were found to be significantly associated with depression at six, twelve, and eighteen months. Compared with individuals in the Invalidating Environment class, individuals in the Parental Stressors class had a 0.67 increase in standardized depression scores at six months postpartum (SE 0.18, $p < .000$). Since depression was measured differently in each cohort (SCL-90 for cohort 1 and CES-D for cohort 2), I harmonized the data from both cohorts by standardizing the depression scores: I calculated the mean and standard deviation depression score for each of the cohorts and subtracted this from each individual's depression score, and then divided that number by the standard deviation. The resulting standardized scores were then comparable in terms of giving information on how far that individual's depression value was from the mean for that cohort. Z-scores range from -3 standard deviations to +3 standard deviations, with a z-score of 0 indicating that the score is equal to the mean. Individuals in the Violence and Abuse class similarly had a 0.61 increase in standardized depression scores at six months, in comparison with individuals in the Invalidating Environment (SE 0.24, $p < .001$). These results were similar for postpartum depression at twelve months, although individuals in the Violence and Abuse class had a slightly less significant increase in depression scores (SE 0.23, $p < .01$). Individuals in the Parental Stressors class had a .93 increase in standardized depression scores at twelve months compared with the Invalidating Environment class (SE .18, $p < .000$). Depression outcomes at eighteen months had the most robust associations for both of the latent classes: compared with the Invalidating Environment class, individuals in the Parental Stressors class saw a .99 increase in standardized depression scores

(SE .18, p < .000), and individuals in the Violence and Abuse class saw a .80 increase in standardized depression scores (SE .23, p < .000).

Adding baseline, or prenatal, depression into the regression model attenuated but did not erase the direct effect of trauma on postpartum depression scores. Prenatal depression proved to be a consistently significant predictor of postpartum depression outcomes at six (*b* .4, SE .06, p < .000), twelve (*b* .41, SE .06, p < .000), and eighteen (*b* .46, SE .06, p < .000) months. Given the effect of prenatal depression, assignment in the Violence and Abuse class did not significantly predict postpartum depression at six months. However, assignment in the Parental Stressors class was associated with a significant increase in standardized depression scores (*b* .41, SE .18, p < .001). Postpartum depression at twelve and eighteen months was still significantly associated with assignment in the Parental Stressors and Violence and Abuse class. Assignment in the Parental Stressors class was associated with a .64 increase in twelve month standardized scores (SE .17, p < .000) and a .69 increase in eighteen month standardized scores (SE .16, p < .000), while taking into account prenatal depression. Assignment in the Violence and Abuse class was associated with a .39 increase in twelve month standardized scores (SE .21, p < .05) and a .44 increase in eighteen month standardized scores (SE .21, p < .01), while taking into account prenatal depression.

Cohort 2 Results

The Cohort 2 results nearly identically replicated the Cohort 1 results, with a couple of exceptions. In keeping with the Cohort 1 results, assignment in both the Parental Stressors class and Violence and Abuse class were significantly associated with postpartum depression at six and eighteen months. For those in the Parental S tressors class, standardized depression scores increased .60 at six months (SE .15, p < .000) and .58 at eighteen months (SE .16, p < .000). For those in the Violence and Abuse class, standardized depression scores increased .48 at six

months (SE .23, $p < .01$) and .40 at eighteen months (SE .24, $p < .05$). One deviation from the Cohort 1 results was the twelve month postpartum depression outcomes. Assignment in the Parental Stressors class had no association with depression at twelve months. Assignment in the Violence and Abuse class was significantly associated with a *decrease* in twelve month postpartum depression scores (SE .24, $p < .01$). Recall that these coefficients are interpreted in reference to the Invalidating Environment class. Switching the reference category for the twelve month outcomes yielded similar results, in that the Parental Stressors class was not associated with twelve month outcomes and that both the Violence and Abuse class and Invalidating Environment class were significantly associated with decreases in twelve month depression outcomes. These trends were reversed by the eighteen month depression outcomes, where Cohort 2 again mirrored Cohort 1 with the Parental Stressors class having a .58 increase in standardized scores (SE .16, $p < .000$), and the Violence and Abuse class having a .40 increase in standardized scores (SE .24, $p < .05$).

After adding prenatal depression to the model, the only difference in results between Cohorts 2 and 1 was that prenatal depression fully accounted for the significance of the Violence and Abuse class's impact on six month postpartum scores in Cohort 1, while prenatal depression fully accounted for the significance of the Violence and Abuse class's impact on twelve month postpartum scores in Cohort 2. As with Cohort 1, prenatal depression was consistently significantly associated with postpartum depression at six (b =.50, $p < .00$), twelve (b =.40, $p < .00$), and eighteen (b =.31, $p < .00$) months. The Parental Stressors class and Violence and Abuse class retained significance at six (Parental Stressors b =.34, < .01; Violence and Abuse b =.37, $p < .05$) and eighteen (Parental Stressors b =.41, $p < .001$; Violence and Abuse b =.38, $p < .05$) months. While the Violence and Abuse class was not significant at twelve months postpartum

when accounting for prenatal depression, the Parental Stressors class was associated with a .30 increase in standardized depression scores.

Table 3. Cohort 1 Regression Results

	Postpartum Depression: 6 months			***Postpartum Depression: 12 months***			***Postpartum Depression: 18 months***			***Postpartum Depression: 6 months***			***Postpartum Depression: 12 months***			***Postpartum Depression: 18 months***		
Variable	*b*	SE	*t*	*b*	SE	*t*	*b*	SE	*t*	*b*	SE	*t*	*b*	SE	*t*	*b*	SE	*t*
Intercept	0.91	0.12	0.15	1.50	1.23	1.22	1.62	1.22	1.32	1.06	1.17	0.90	2.31	1.12	2.06*	2.61	1.08	2.41*
Age	-0.04	0.06	0.71	-0.11	0.06	01.81*	-0.12	0.06	1.96*	-0.08	0.06	1.39	-0.15	0.05	2.64*	-0.17	0.05	2.99**
HS grad	-0.09	0.18	0.52	-0.00	0.17	0.00	-0.05	0.17	0.29	-0.16	0.16	0.96	-0.02	0.16	0.16	-0.12	0.15	0.77
Employed	0.15	0.15	1.01	-0.15	0.14	1.05	-0.10	0.14	0.73	0.19	0.14	1.38	-0.11	0.13	0.83	-0.06	0.13	0.49
LC 1 Ref: LC 3	0.67	0.18	3.56**	0.93	0.18	5.10**	0.99	0.18	5.27**	0.40	0.17	2.29*	0.64	0.17	3.78**	0.68	0.16	4.19**
LC 2 Ref: LC 3	0.60	0.23	2.52*	0.73	0.23	3.20*	0.80	0.23	3.47**	0.29	0.22	1.31	0.38	0.21	1.78*	0.43	0.20	2.09*
Prenatal Depression										0.40	0.06	6.63**	0.41	0.05	7.10**	0.46	0.05	8.30**

*Significance codes 0 ** - .001 **, .01 * - .05 **

LC 1 = Parental Stressors class; LC 2 = Violence and Abuse class; LC 3 (reference class) = Invalidating Environment class

Table 4. Cohort 2 Regression Results

	Postpartum Depression: 6 months			***Postpartum Depression: 12 months***			***Postpartum Depression: 18 months***			***Postpartum Depression: 6 months***			***Postpartum Depression: 12 months***			***Postpartum Depression: 18 months***		
Variable	*b*	SE	*t*	*b*	SE	*t*	*b*	SE	*t*	*b*	SE	*t*	*b*	SE	*t*	*b*	SE	*t*
Intercept	1.06	1.20	0.88	0.80	1.28	0.62	1.17	1.24	0.94	1.47	1.05	1.39	1.29	1.17	1.10	1.45	1.20	1.21
Age	-0.12	0.06	1.93*	-0.04	0.06	0.71	-0.09	0.06	1.48	-0.11	0.05	2.09*	-0.08	0.06	0.17	-0.09	0.06	1.52
HS grad	0.21	0.18	1.21	-0.09	0.18	0.52	0.08	0.18	0.47	0.13	0.15	0.86	-0.01	0.17	0.05	0.04	0.17	0.24
Employed	0.09	0.16	0.56	0.15	0.15	1.01	-0.06	0.16	0.36	-0.03	0.14	0.23	-0.03	0.15	0.21	-0.13	0.16	0.82
LC 1 Ref: LC 3	0.60	0.15	3.91**	0.06	0.19	0.33	0.57	0.15	3.64**	0.33	0.13	2.44*	0.30	0.15	1.96*	0.41	0.15	2.63**
LC 2 Ref: LC 3	0.47	0.23	2.08*	-0.60	0.23	2.52*	0.40	0.23	0.08*	0.37	0.20	1.83*	0.23	0.22	1.04	0.38	0.22	0.09*
Prenatal Depression										0.50	0.05	8.72**	0.40	0.06	6.20**	0.31	0.06	4.93**

*Significance codes 0 ** - .001 **, .01 * - .05 **

LC 1 = Parental Stressors class; LC 2 = Violence and Abuse class; LC 3 (reference class) = Invalidating Environment class

Discussion

This study provides new insight into the nature of the relationship between prenatal depression and childhood trauma as it relates to postpartum depression outcomes. It utilized outcomes from p aper 1, in which an LCA resulted in three childhood trauma typologies: the Parental Stressors Class, the Violence and Abuse Class, and the Invalidating Environment Class. This paper extends prior person-oriented approaches to classifying trauma (Stargel & Easterbrooks, 2020; Lee, Gilchrist, Beadnell, Lohr, Yuan, Hartigan, & Morrison, 2017; Yoon, Cederbaum, Mennen, Traube, Chou, & Lee, 2019) in its expanded and inclusive definition of childhood trauma. It also lends to the literature on the etiology and maintenance of postpartum depression by examining the effect of maternal childhood trauma over and above the most widely cited and established risk factor for postpartum depression – prenatal depression. This paper therefore provided evidence towards the importance of considering trauma-informed approaches when considering preventative efforts for postpartum depression.

A primary aim of this study was to determine whether individuals with a higher probability of assignment into various latent classes of maternal childhood trauma would be associated with postpartum depression. A higher probability of assignment into the Parental Stressors class and Violence and Abuse class nearly universally significantly predicted increases in postpartum depression across all time points. Supplementary analyses found in the Appendix show that the Invalidating Environment class was also significantly associated with postpartum depression rates. However, the differences between the classes are noteworthy. Of the three classes, the Parental Stressors class had the strongest associations with postpartum depression rates. In fact, exploratory analyses using the Parental Stressors class as the reference class resulted in significant but negative coefficients for the Violence and Abuse and Invalidating Environment classes, meaning that those individuals experienced a smaller increase in

depression standardized scores compared with individuals in the Parental Stressors class. Further research is needed, both to corroborate these findings and to understand why childhood trauma of this particular typology seemed to exert a greater effect on postpartum depression outcomes. It is possible that the Parental Stressors class had the strongest effect on mental health outcomes because the types of childhood trauma contained in this class – parental substance use disorders, parental arrest, parental death, and parental divorce – could have also negatively impacted parenting practices. If that is the case, one might also hypothesize that the Invalidating Environment class would be more strongly associated with postpartum depression outcomes over the Violence and Abuse class, when using the Parental Stressors class as the reference category – since the Invalidating Environment class was typified by emotional abuse from the mother's parents and poor family cohesion. This did appear to be the case for the majority of the postpartum depression outcomes across both cohorts (see supplementary tables in the Appendix). Future research could investigate whether different domains of trauma seem to differentially impact mental health outcomes. Previous research on maternal childhood trauma and mental health during the perinatal period have yielded mixed results. One systematic review found that emotional abuse emerged as a maltreatment subtype associated with perinatal depression, distinct from physical or sexual abuse – which is consistent with the findings from this analysis (Choi & Sikkema, 2016). In contrast, other research found that maltreatment ACEs but not family dysfunction ACEs was associated with perinatal depression; however, this study was conducted with a relatively small sample (N=101) and called for more research into trauma typologies and perinatal mood disorders (Atzl, Narayan, Rivera, & Lieberman, 2019).

A secondary aim of this study was to examine trauma's impact in the context of prenatal depression. While trauma-informed care has been gaining traction in obstetric practice, the

prevailing notion remains that screening for depression during pregnancy affords one of the best ways to prevent postpartum depression. These analyses demonstrated that prenatal depression is an undeniable risk factor for postpartum depression. However, trauma maintained a direct effect on postpartum depression at almost all time points. This finding is significant not only because it emphasizes the importance of childhood trauma as a distinct – and considerable – risk factor for postpartum depression, independent of prenatal depression, but also because it raises new questions surrounding the relationship between childhood trauma and prenatal depression. Perinatal depression – which encompasses prenatal depression and depression lasting through eighteen months postpartum – has been notoriously difficult to operationalize due to variability in presentation and uncertainties regarding its etiology (Guintivano, Putnam, Sulllivan, & Meltzer-Brody, 2019; Kendig, Keats, Hoffman, Kay, Miller, Simas,…&Lemieux, 2017). For instance, researchers have argued that emotional and behavioral changes associated with fluctuating hormones during pregnancy and postpartum distinguish perinatal depression from other forms of depression (Szpunar & Parry, 2018; Sha, Achtyes, Nagalla, Keaton, Smart, Leach, & Brundin, 2021; Glynn, Davis, & Sandman, 2013). Other researchers have argued that perinatal depression has to do primarily with the incredible shift in identity that is associated with becoming a new parent (Putnam, Wilcox, Robertson-Blackmore, Sharkey, Bergink, Munk-Olsen,…& Causes, 2017). The results of this study may indicate that, for some, prenatal depression could be a 'proxy' for the myriad emotional and behavioral difficulties associated with surviving childhood trauma. In other words, a childbearing individual may score highly on a prenatal depression measure not because they have prenatal depression per se, but because they are coping with the emotional and behavioral repercussions of childhood trauma. If this is the case, it would mean that addressing various forms of childhood trauma could be a powerful

way of decreasing prenatal and postpartum depression rates. Further research is needed to disentangle the effects of prenatal depression and childhood trauma in order to inform intervention and prevention efforts related to postpartum depression.

This study holds implications for social work practice as well as clinical implications for prenatal care and perinatal mental health. Regarding social work practice, the findings from this study lend support to the hypothesis that childhood trauma exerts a distinct effect on risk for perinatal and postpartum depression. The types of childhood trauma included in the latent class analysis - and used in the regression analyses in this paper - are deeply intertwined with social determinants of health and larger, structural forces (e.g., community violence, poverty, food scarcity). It is possible that addressing social justice factors that are associated with childhood trauma could ameliorate the relative burden of perinatal depression later on in life. Perinatal depression exerts a considerable burden on both childbearing individuals and their children. If addressing childhood trauma could decrease risk for perinatal depression, it is possible that this would ease the mental health impact on not one but two generations. There are additional clinical implications for perinatal health and mental health as a result of this analysis. Currently, ACOG recommends universal screening for prenatal depression at least once during a person's pregnancy. Practitioners are able to code for these screens so that they are reimbursed by insurance for their time. Given the results of this study, universal screening for childhood trauma could also be an effective way to identify individuals who would benefit from greater social, economic, or mental health support. Universally screening for trauma could also help alert practitioners about childbearing individuals who have traumatic histories related to sexual or physical abuse and who may benefit from more options, control, and agency in anything from the first transvaginal ultrasound to identify a viable embryo to labor and delivery preferences. It

could also signal practitioners to bring in external resources, such as doulas, many of whom are trained to provide trauma-informed services and whose presence seems to significantly benefit childbearing individuals' labor experiences (Gruber, Cupito, & Dobson, 2013). Understanding the influence of childhood trauma on prenatal and postpartum mental health could also mean shifting our understanding of clinical care for perinatal depression. While cognitive behavioral therapy (CBT) and interpersonal psychotherapy (IPT) have been shown to decrease perinatal depression (Bledsoe & Grote, 2006; Fitelson, Kim, Baker, & Leight, 2011), it is possible that trauma-informed therapeutic modalities and community-centered responses could be just as beneficial while also validating – or making visible – the extent of childhood trauma within this population.

Limitations and strengths

The current study has several limitations. First, the amount of error built into the formation of the latent classes poses some challenges to validity with respect to the subsequent regression analyses. As mentioned previously, using the latent class posterior probabilities as predictor variables in the regressions leads to overestimated standard errors, which could distort the interpretation of the results. New methods are constantly forming to address the challenge of incorporating person-oriented methodologies such as LCA in larger mixture models (e.g., Vermunt & Magidson, 2021). Given the structure of the data and the methods that have been vetted to date, using the posterior probabilities was deemed the most intuitive method for this study. A second limitation – but arguably a strength of the first paper in this dissertation – was the fact that there was no 'normative' latent class in the 3-class solution. This meant that identifying a reference category for the purposes of the regression analyses posed a bit of a challenge in the interpretation of the regression results, as the latent classes in the regression were not in relation to a normative or neutral reference category. However, supplementary

analyses available in the Appendix provide a holistic picture of the regression results with rotating each of the latent classes as the reference category. Finally, differences between Cohorts 1 and 2 led to the decision to run the regression analyses separately for each cohort despite the fact that the latent classes were formed using the entire sample. Cohort 2 had slightly greater attrition by the 18-month follow-up compared with Cohort 1, and I opted to use complete case analysis with the separate cohorts rather than combining each and using imputation to address the missing data. Cohort 1 and Cohort 2 also used different depression measures: Cohort 1 utilized questions from the SCL-90, while Cohort 2 used the CES-D. Because the questions taken from the SCL-90 were not part of a separate sub-scale with a clinical cutoff for depression, I made the decision to standardize scores across the two cohorts in order to better compare the two when interpreting the results. Analyzing the cohorts separately proved to be one of the main strengths of this paper, in that Cohort 2 nearly identically replicated the results from Cohort 1 – these were two completely independent samples, and the reliability of the results provides even greater rationale for understanding trauma as both a distinct predictor of postpartum depression as well as a potential influence in the etiology of what we currently understand as prenatal depression. An additional strength of this study was the decision to examine the direct effect of trauma with and without prenatal depression as a covariate. This accounted for prenatal depression's potential confounding role in the relationship between childhood trauma and postpartum depression, while also emphasizing the remaining direct effect of trauma on postpartum depression.

Conclusion

This study examined the influence of maternal childhood trauma on postpartum depression outcomes at three time points. It's use of latent classes in the mixture model provided

new and important insights into potential variation in the ways typologies of childhood trauma impact mental health outcomes. It also emphasized the importance of childhood trauma as a distinct risk factor for postpartum depression over and above prenatal depression alone.

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Chapter 4

Sources of Resiliency and Risk in Trauma-Exposed Adolescent Mothers and Their Children

Abstract

Attachment has been hypothesized to be a potential mechanism facilitating intergenerational trauma. Insecure attachment has been associated with low maternal sensitivity, and is also a risk factor for subsequent internalizing and externalizing behavioral problems in early childhood. However, very few studies have examined the impact of maternal childhood trauma and postpartum depression on attachment outcomes, which could be a mechanism linking maternal childhood trauma and internalizing and externalizing behavior problems in offspring. Additionally, few studies have incorporated maternal parenting stress as an additional maternal behavioral factor that could affect mother-infant attachment. This is the first study to examine the relationship among these variables within a sample of adolescent mothers and using a gold-standard protocol to determine attachment styles (namely, the Strange Situation Procedure).

Aims: This paper has two aims: (1) to examine the effect of maternal childhood trauma and postpartum depression on mother-infant attachment at twelve months, and (2) to examine the effect of maternal childhood trauma and postpartum depression on postpartum parenting stress at twelve months.

Methods: This study utilized data from the Young Women Childhood and Development Study (YCDS). Aim one included a logistic regression of maternal trauma and postpartum depression on attachment outcomes at twelve months. Aim two included a linear regression of maternal trauma and postpartum depression on postpartum parenting stress at twelve months.

Results: Neither childhood trauma nor postpartum depression were associated with insecure attachment at twelve months. In contrast, both postpartum depression and maternal

trauma were associated with postpartum parenting stress. Maternal trauma was particularly associated with parent distress, while postpartum depression was more strongly associated with parent-child dysfunction and mothers' perceptions of their child's temperament.

Conclusion: This study found no adverse impact on mother-infant attachment, despite the context of elevated stress and lifetime trauma exposure. This finding highlights the resiliency inherent in young mothers' ability to respond consistently and sensitively to the needs of their infants. It further suggests the potential for secure attachment as a tool for disrupting intergenerational cycles of trauma.

Keywords: adolescent childbearing, childhood trauma, perinatal mental health, parenting stress

Introduction

Maternal childhood trauma has been identified as a specific 'risk factor' for offspring maladaptive mental health outcomes, with prior studies documenting associations between maternal childhood trauma and offspring substance use disorders, offspring abuse, and increased internalizing and externalizing disorders in childhood and adolescence (Su, D'Arcy, & Meng, 2020; Langevin, Marshall, & Kingsland, 2019; Thornberry, Knight, & Lovegrove, 2012; Louise Murray, Kaiser, & Valdebenito, 2018; Plant, Pawlby, Pariante, & Jones, 2018). Despite these well-documented associations, it remains unclear what the intermediary *drivers* of these associations are. Without a better understanding of the most important factors connecting maternal childhood trauma and offspring behavioral health problems, it is difficult to devise interventions that can reliably disrupt this intergenerational cycle.

Attachment as a Mechanism of Intergenerational Trauma

Maternal-infant attachment has been hypothesized to be one such driver of the association between maternal childhood trauma and offspring behavioral outcome. Attachment theory was first conceptualized by John Bowlby, who defined the phenomenon as the reciprocal relationship between a mother and her child (Bowlby, 1979). Bowlby's theory was further developed by Mary Ainsworth, who additionally created a procedure known as the Strange Situation which was devised to classify mother-infant dyads into various categories of attachment 'security' or 'insecurity' (Bretherton, 1992). In the Strange Situation, a mother, infant, and research coordinator (the 'stranger) go through a series of eight three-minute episodes in which the infant is either alone with mother, alone with stranger, with both mother and stranger, or alone by themselves. Attachment security is rated based on the infants' responses to these different contexts. In the time since the Strange Situation (and other contemporary models

for classifying attachment quality) was developed, the study of secure attachment, its etiology, and the downstream effects of sub-optimal attachment have become their own considerable research agendas.

Risk Factors and Protective Factors of Secure Attachment

Studies that have examined predictors of secure attachment have overwhelmingly cited inconsistencies in methodology that make drawing broad and reliable conclusions difficult. One meta-analysis found that maternal sensitivity was predictive of secure attachment across a series of studies that used the Strange Situation (Goldsmith & Alansky, 1987). A more recent empirical study corroborated these findings, stating that maternal sensitivity to infant distress, specifically, was associated with secure attachment at fifteen months (McElwain & Booth-LaForce, 2006). Other studies have focused on risk factors related to the mother that might result in insecure or disorganized attachment styles. Maternal depression and other forms of serious mental illnesses have been associated with insecure or disorganized attachment (Cornish, McMahon, Ungerer, Barnett, Kowalenko, & Tennant, 2006; Nagata, Nagai, Sobajima, Ando, & Honjo, 2003; Rogosch, Cicchetti, & Toth, 2004). The studies that have linked maternal mental health to sub-optimal attachment outcomes have further hypothesized that conditions such as depression dampen the maternal sensitivity response which seems to otherwise promote secure attachment (Moran, Forbes, Evans, Tarabulsy, & Madigan, 2008; DeWolff & van Ijzendoorn, 1997).

When it comes to maternal trauma and the impact on mother-infant attachment, the consensus in the literature appears to be that trauma has been independently associated with insecure and avoidant attachment behavior. A recent review of perinatal trauma and attachment concluded that mothers with a history of trauma, and especially mothers who carry a formal diagnosis of posttraumatic stress disorder (PTSD), tend to have higher rates of bonding and

attachment issues with their children (Erickson, Julian, & Muzik 2019). One study found differences between trauma abuse typologies and attachment outcomes among a group of low-income mothers and their infants: maternal physical abuse was associated with hostile behavior towards the infant, while maternal sexual abuse was associated with low maternal sensitivity and flat maternal affect. The study additionally found that insecurely attached infants of mothers in the trauma-exposed group displayed disorganized strategies, while insecurely attached infants of mothers without histories of trauma displayed primarily avoidant strategies (Lyons-Ruth & Block 1996). Finally, one recent study found that both maternal childhood trauma and current partner violence were associated with insecure but not disorganized attachment styles (Galbally, Watson, van Ijzendoorn, Tharner, Luijk, & Lewis, 2022).

Few studies have examined early infant mental health outcomes and attachment styles among infants of trauma-exposed adolescent mothers. One recent study found that partner violence negatively impacted attachment styles even in the context of enhanced social services during the prenatal period (Quinlivan & Evans, 2005). Another study found teen mothers' sexual and physical abuse histories exerted a direct effect on insecure infant attachment, which in turn was associated with externalizing problems in early childhood (Pasalich, Cyr, Zheng, McMahon, & Spieker, 2016). Among teenage mothers without trauma histories, studies have cited higher rates of insecure and disorganized attachment styles when compared with infants of adult mothers (Lamb, Hopps, & Elster, 1987; Long, 2009; Cyr, Euser, Bakermans-Kranenburg, & Van Ijzerdoorn, 2010; Osofsky & Thompson, 2000). The present study adds to the relative paucity of literature on attachment outcomes among trauma-exposed adolescent mothers. It is the second study of its kind to examine the impact of both maternal depression and maternal trauma history on attachment among adolescent mothers using the Strange Situation procedure.

Aims

This study has two aims. First, it examines the impact of maternal childhood trauma on attachment security at twelve months, taking into account the effect of maternal depression. Second, it examines the impact of maternal childhood trauma and maternal depression on postpartum parenting stress during the infant's first year of life. Collectively, these aims test two hypothesized drivers of intergenerational trauma - attachment and parenting - among a unique cohort of adolescent mothers.

Method

Data

This study used data from the Young Women and Child Development Study (YCDS), which was initially funded by the National Institute on Drug Abuse (NIDA) in 1987 (Gilchrist, PI). The aims of the original study included: characterizing the onset of drug use, school failure, aggression, interpersonal violence, and delinquency among the children of adolescent mothers; conceptualizing various profiles with regard to behavior and development for both the mothers and their children; examining the role of executive functioning in parenting practices and maternal behavior; and examining the study findings in context of four different models of intergenerational transmission (Gilchrist, PI). The total sample includes 495 adolescent (ages 13-17) women recruited at some point during their pregnancy in three urban counties in the Northwestern US. Enrollment eligibility included: being younger than 18 at the time of enrollment, planning to continue the pregnancy and parent the child, and being English-speaking. These women and their children were followed longitudinally for approximately fifteen years.

Sample

Recruitment for the full YCDS sample occurred over two time points and resulted in two participant cohorts. Cohort 2 was the only cohort to complete the Ainsworth Strange Situation procedure at the twelve-month postpartum follow-up, and for that reason was the only cohort used in the present study. Recruitment for Cohort 2 began in 1992, five years after Cohort 1. Women in Cohort 2 were recruited at public and private hospital prenatal clinics, public school alternative programs, and social service agencies in the Pacific Northwest. All recruitment and data collection were governed by the Institutional Review Board. The total sample for Cohort 2 consisted of 255 pregnant adolescents whose racial backgrounds were roughly representative of the geographic recruitment area (59% white, 22% Black or African American, and 19% Biracial, Asian/Pacific Islander, or Indigenous). The adolescents were, on average, 16 years old (Range: 12-17; SD: 1.0) and the majority (74%) were either currently in school, had achieved their GED, or had graduated from high school.

Since the sample size for the attachment outcomes was approximately 75% of the total sample for Cohort 2 (184 versus 255, respectively), a t-test to examine differences between the full cohort and the sub-set included in the attachment sample was run with baseline depression scores as the outcome variable. The results from this t-test can be found in Appendix Table 3; the averages between the two samples did not significantly differ from one another.

Once participants were enrolled, they completed a baseline interview during pregnancy and subsequent follow-up interviews every six months for the first three years of the baby's life. This study utilized data from the baseline, Wave 2 (six month) and Wave 3 (twelve month) interviews. At twelve months, a subsample (n=184) of mother-infant dyads completed the Ainsworth Strange Situation procedure. The procedure was completed in a university laboratory and coded independently by two trained researchers. In the case of any discrepancies in the

attachment classification, the two trainers conferenced with an expert who was also part of the original study team. Prior to any conferencing, interrater agreement on the classification categories was 82% (Oxford & Spieker, 2006). Mother-infant dyads were excluded from this sub-sample if the child was no longer living primarily with them, if they lived far from the university laboratory, or if they had experienced a miscarriage or death.

Measures

Childhood trauma

Childhood trauma was captured using the three latent classes resulting from the analysis in Paper 1. For more information on the trauma constructs included for the formation of the latent classes, please refer to Paper 1. The three latent classes resulting from that analysis included: the Parental Stressors class, which consisted of individuals whose trauma consisted of factors relating to their parents (e.g., parental alcoholism or substance abuse, parental incarceration, foster care, etc.); the Violence and Abuse class, which consisted of individuals whose trauma was primarily instances of rape or sexual abuse or physical abuse from their partner; and the Invalidating Environment class, which consisted of individuals whose trauma was related to emotional abuse from their parents as well as poor family cohesion.

Depression

Depression was ascertained using the Center for Epidemiological Studies Depression Scale (CES-D), which is a 20-item self-report measure about depressive symptoms in the past week (Radloff, 1977). Mothers completed the CES-D at the baseline interview and each of the follow-up interviews. This study used mothers' depression scores at six months postpartum. Results from the CES-D were scored and retained as continuous variables for both the logistic regression (attachment outcomes) and linear regression (postpartum parenting stress outcomes).

Preliminary analyses examining any differences in rates of depression between the samples for the logistic and linear regression analyses, as well as differences in rates of depression as they relate to other variables in the analyses, recoded the CES-D score into a binary category (1 = depressed, 0 = not depressed) according to the CES-D clinical cutoff of 16 or higher.

Attachment

This study used the Strange Situation Procedure (SSP, Ainsworth, Blehar, Waters, & Wall, 1978) to measure attachment security at twelve months. Due to various logistical challenges including difficulty traveling to the university laboratory to complete the SSP, only a sub-portion of Cohort 2 completed the SSP. Videotapes of the interactive sequence were coded into insecure-avoidant (A), secure (B), and insecure-ambivalent (C) categories according to the procedures outlined by Ainsworth et al. (1978). A fourth category, insecure-disorganized/disoriented (D) was included as well following the Main and Solomon (1990) protocol. The Strange Situation videos were independently coded by two researchers trained by one of the principal investigators of the original study. Preliminary analyses retained all four attachment styles when examining possible differences between the other variables in the study. For the logistic regression, attachment was re-coded into a binary variable (1 = securely attached, 0 = not securely attached). The variable was re-coded due to the relatively low sample size in some of the attachment sub-categories.

Postpartum Parenting Stress

Postpartum parenting stress was ascertained using the Parenting Stress Index - Short Form (PSI-SF, Abidin, 1995). A brief version of the original Parenting Stress Index (PSI, Abidin, 1995), this measure has 36 items that inquire about a domain of parent-related stressors. In addition to calculating a total score based off the raw score from the 36 questions, the PSI-SF

also contains three subscales: Parental Distress, Parent-Child Dysfunctional Interaction, and Difficult Child. Previous research has studied the psychometric properties of this measure and reported good internal consistency for the total scale along with the three subscales (Barroso, Hungerford, Garcia, Graziano, & Bagner, 2016). For the linear regression analysis, scores for the total scale and each of the subscales were calculated and maintained as continuous variables.

Covariates

The three covariates used in the regression analyses include maternal age, maternal educational attainment, and employment status. Each of the covariates was measured at the time of the SSP (attachment outcomes) or PSI-SF (parenting stress outcomes) so that it reflected the mother's age at the time of her child's birth, the mother's educational attainment (high school diploma or GED = 1; none = 0) at the time the outcome variable was measured, and employment status at the time the outcome variable was measured (employed = 1; not employed = 0).

Analysis

Attachment Outcomes

Logistic regression was used to examine the impact of maternal trauma on attachment security at twelve months postpartum. In logistic regression, continuous or categorical regressor variables are related to a binary outcome variable. I used Bartholomew, Steele, & Moustaki's (2008) theory and model for relating the linear regression model to a logistic regression model. Beginning with the linear model given by

$$\pi(x_1, \ldots, x_k) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k$$

the logarithmic function adapts this by adding a "*systematic component*":

$$\pi(x_1, \ldots, x_k) = \frac{\exp L}{1 + \exp L}$$

Where

$$L = \alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k$$

and a "*random component*"

$$y|(x_1, \ldots, x_k) \sim \text{Bernoulli}(\pi(x_1, \ldots, x_k))$$

The above equations give the conditional probability that $y = 1$ for the values of $x(1),...,x(k)$ by $\pi(x(1),...,x(k))$. The systematic component corresponds to the way π relates to the xs and the random component corresponds to the way y relates to π - this is analogous to the distribution of the random component e in a linear regression model. The Bernoulli distribution in the final equation is a variation of the Binomial distribution in which a random variable y will take the value 1 with probability π and the value 0 with probability $(1 - \pi)$. The exponential equation demonstrates the exponential transformation of L, and the inverse is consequently the log function $\log(M) = L$. The full logistic regression equation is therefore given by

$$\text{logit}(\pi) = \log\left(\frac{\pi}{1-\pi}\right) = L = \alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k$$

The above model assumes that the observations are independent. Therefore, the fitted logistic regression for attachment would be

secure attachment = a + ß$_1$(Age) + ß$_2$(Education) + ß$_3$(Employment) + ß$_4$(Posterior Probabilities for Class 1) + + ß$_5$(Posterior Probabilities for Class 2) + ß$_6$(Postpartum Depression).

The analysis was restricted to the YCDS sub-sample who completed the Strange Situation procedure at twelve months postpartum. All analyses were performed in R 4.1.3 (R Core Team, 2017). In order to be consistent with both the method and the interpretation from Chapter 3, this analysis used the posterior probabilities from the latent class analysis in Chapter 2 as predictor variables in the model. Latent Class 3 (Invalidating Environment class) was retained as the

reference category. For more background on the theory guiding the choice of using posterior probabilities over other methods, please refer to Chapter 3.

Postpartum Stress Outcomes

Multiple linear regression was used to examine the association between maternal childhood trauma and postpartum parenting outcomes via the PSI. As with the linear regression analyses in Chapter 3, as well as the logistic regression in this paper, the posterior probabilities for Latent Class 1 and Latent Class 2 were entered into the model as predictor variables with Latent Class 3 as the reference category. This analysis was also constrained to Cohort 2 but included a complete case analysis of the full Cohort 2 sample (n = 255). ANOVAs examined baseline associations between the latent classes and parental stress scores, the results of which can be found in Appendix Table 4. A total of four regression analyses were completed with the following outcome variables: (1) PSI total score; (2) the Parental Distress subscale; (3) the Parent-Child Dysfunctional Interaction subscale; and (4) the Difficult Child subscale. The standard model for multiple linear regression was given in Chapter 3; the regression models for this analysis are as follows:

$$\text{PSI Total Score} = ß_0 + ß_1(\text{Age}) + ß_2(\text{Education}) + ß_3(\text{Employment}) + ß_4(\text{Child Sex}) + ß_5(\text{Posterior Probabilities for Class 1}) + ß_6(\text{Posterior Probabilities for Class 2}) + ß_7(\text{Depression}) + E$$

$$\text{Parental Distress} = ß_0 + ß_1(\text{Age}) + ß_2(\text{Education}) + ß_3(\text{Employment}) + ß_4(\text{Child Sex}) + ß_5(\text{Posterior Probabilities for Class 1}) + ß_6(\text{Posterior Probabilities for Class 2}) + ß_7(\text{Depression}) + E$$

$$\text{Parent-Child Dysfunction} = ß_0 + ß_1(\text{Age}) + ß_2(\text{Education}) + ß_3(\text{Employment}) + ß_4(\text{Child Sex}) + ß_5(\text{Posterior Probabilities for Class 1}) + ß_6(\text{Posterior Probabilities for Class 2}) + ß_7(\text{Depression}) + E$$

$$\text{Difficult Child} = ß_0 + ß_1(\text{Age}) + ß_2(\text{Education}) + ß_3(\text{Employment}) + ß_4(\text{Child Sex}) + ß_5(\text{Posterior Probabilities for Class 1}) + ß_6(\text{Posterior Probabilities for Class 2}) + ß_7(\text{Depression}) + E$$

All analyses were conducted using R 4.1.3 (R Core Team, 2017).

Results

Table 1 presents the baseline associations between the variables in the model and each of the attachment classifications, for all mother-infant dyads who completed the Strange Situation procedure. The majority (N=83) of mother-infant dyads were deemed to have secure attachment, followed by disorganized (N=39), insecure-avoidant (N=36), and insecure-ambivalent (N=26). Mothers with depression had the greatest proportion of 'disorganized' classification on the Strange Situation compared to other categories. Of mothers who were in the Parental Stressors latent class, the greatest proportion of attachment classification was Secure. This was in contrast to mothers in the Violence and Abuse class, whose greatest proportion was insecure-avoidant, or mothers in the Invalidating environment class, whose greatest proportion was insecure-ambivalent. Mothers who were age 16 or younger at the time of their baby's birth had a much lower proportion of secure attachment at 12 months – merely 6 percent. However, collapsing the attachment categorization into secure vs. other makes the secure attachment category the minority (83 securely attached vs 101 other) in this sample. Chi-square tests showed few statistically significant differences between securely attached vs non-securely attached dyads: maternal age was significant at $p = 0.00$ and maternal education was only marginally significant at $p = 0.07$.

Attachment Outcomes

Results from the logistic regression model examining the association between depression, trauma, and attachment security at twelve months is presented in Table 3. All of the variables in the model were entered simultaneously. A few of the variables in the model had sizable odds ratios. Holding all other variables constant, the odds of secure attachment for mothers who were sixteen or older was 1.01 times greater than the odds for mothers who were younger than sixteen at the time of the baby's birth. However, the Wald X^2 test was not significant for this association. Similar patterns were found for child sex and the Parental Stressors latent class. Given the other variables in the model, the odds of secure attachment for female toddlers was 1.13 times that of the odds for male toddlers, although the Wald X^2 test was not significant for this association. Finally, the odds of secure attachment for mothers in the Parental Stressors latent class was 1.41 times greater than mothers in the Invalidating Environment class, although again the Wald X^2 test was not significant for this association. In summary, the independent variables and covariates in the logistic regression model did not meaningfully predict attachment security at twelve months.

Postpartum Stress Outcomes

After the null findings in the attachment model, I added an analysis examining the impact of the trauma latent classes and postpartum depression on various domains of parenting stress at twelve months postpartum as measured by the PSI-SF. I completed a total of four regression models, one with the PSI-SF total score as the dependent variable and the following three with each of the PSI-SF subscales as the dependent variable. The covariates and independent variables for all four models were entered simultaneously. Consistent with the logistic regression model in

this paper, Latent Class 3 (the Invalidating Environment class) was retained as the reference category.

The results from these analyses can be found in Table 4. Overall, both the trauma latent classes and postpartum depression had an association with postpartum parenting stress, and there appeared to be more variation in the association between the trauma latent classes and the postpartum stress outcomes for the PSI-SF total as well as the Distress Subscale. Additionally, the trauma latent classes seemed to have the weakest association with the Difficult Child Subscale.

PSI-SF Total

The first linear regression tested the association between the (a) trauma latent classes and (b) postpartum depression at six months, on the total score on the PSI-SF. The model was significant overall ($F(6, 208) = 8.342$, $p < 0.000$), with an R^2 of 0.194. In some contrast to the results from Chapter 3, the trauma latent classes were consistently and collectively highly significant as indicated by the small *p* value for the intercept term which was functioning as the reference trauma category (Latent Class 3, or the Invalidating Environment class). In the PSI-SF total score model, the Invalidating Environment class alone was highly significant ($SE = 20.0$, $p < 0.000$). Given the Invalidating Environment class, and holding all other variables in the model constant, Latent Class 1 (the Parental Stressors Class) was additionally significant in increasing mothers' total scores by 5.31 ($SE = 2.65$, $p < 0.000$). Postpartum depression at six months was associated with a 13.4 increase in the total stress score ($SE = 2.14$, $p < 0.000$).

PSI: Parental Distress

The second linear regression examined the impact of postpartum depression and maternal trauma on the Parental Distress subscale of the PSI-SF. The Parental Distress subscale included

items such as “I often have the feeling that I cannot handle things very well”, and “I feel alone and without friends”. This model was also significant overall ($F(6, 208) = 10.43$, $p < 0.000$), with an R^2 of 0.21. Of all the subscales, and including the PSI total scale, the trauma latent classes were most strongly associated with the parental distress subscale. In addition to the intercept term - the proxy for the Invalidating Environment class - being highly significant, the Parental Stressors class significantly increased mothers’ distress scores by 2.77 ($SE = 1.20$, $p < .05$) and the Violence and Abuse class significantly increased mothers’ distress scores by 4.43 ($SE = 1.76$, $p < .05$). Postpartum depression was also significantly associated with the Parental Distress subscale, with an increase of 6.36 per one unit increase in depression ($SE = 0.97$, $p < 0.000$).

PSI: Parent-Child Dysfunctional Interaction

The third linear regression examined the impact of maternal trauma and postpartum depression on parent-child dysfunctional interaction. This subscale included items such as “Most times I feel that my child does not like me and does not want to be close to me”, and “When I do things for my child I get the feeling that my efforts are not appreciated very much”. The model was significant overall ($F(6, 208) = 2.95$, $p < 0.01$), with an adjusted R^2 of 0.05. Compared with the other two PSI subscales as well as the PSI total stress score, maternal trauma was only marginally associated with parent-child dysfunctional interaction. The intercept term for this regression was only marginally associated with parent-child dysfunction, and neither the Parental Stressors class nor the Violence and Abuse class were additionally significant. Postpartum depression was strongly associated with parent-child dysfunction, with an increase of 3.06 per unit increase in depression ($SE = 0.83$, $p < 0.000$). Given these findings, it seems that postpartum depression is more influential on parent-child dysfunction, compared to maternal childhood trauma.

PSI: Difficult Child

Fourth and finally, I tested the association between maternal trauma, postpartum depression, and mothers' perceptions of their child as a 'difficult child'. This subscale included items such as "My child doesn't seem to smile as much as most children" and "It takes a long time and it is very hard for my child to get used to new things". The model was significant overall ($F(6, 208) = 4.94$, $p < 0.000$) with an adjusted R^2 of 0.10. While the intercept term was strongly associated with the difficult child subscale, only the Parental Stressors class was additionally marginally significantly associated (SE = 1.10, $p < 0.01$). Postpartum depression was again strongly associated with the difficult child subscale (SE = 0.88, $p < 0.000$).

Discussion

In this study, I examined the impact of maternal childhood trauma and postpartum depression on attachment and postpartum stress outcomes among a prospective longitudinal sample of adolescent mothers. Prior studies in adult mothers have identified effects of trauma and depression on attachment styles (Wan & Green, 2009; Choi & Kangas, 2020). However, I did not find that trauma and postpartum depression were significantly associated with attachment outcomes. Subsequent analyses did reveal a consistently significant association between maternal childhood trauma, postpartum depression, and postpartum stress at twelve months. This was true both for total stress and for all three sub-domains of postpartum stress as defined by the PSI-SF. The relatively high proportion of secure attachment among this sample highlights the resiliency that is present for young mothers, notwithstanding their extensive trauma experiences. Alternatively, it could be argued that the Strange Situation procedure is most reliable when performed with the individual who is the primary caregiver - and given the amount of social support that these young mothers may have received from other family members or close friends

could have made the results of the procedure with their biological mother less informative or reliable. The issue of resiliency in the face of extensive trauma that allows for optimal parent-dyad outcomes is a particularly worthy research agenda that should be explored in subsequent analyses. Without the analyses included in the present study, or others like it, it may have been inferred that these effects were the lingering effects of intergenerational trauma. However, these results indicate that other drivers of insecure attachment are at play.

This study had several strengths. The Strange Situation procedure is a gold-standard index of parent-infant attachment that requires considerable time and resources to perform and evaluate. Coupled with the fact that this was carried out within the context of a prospective, longitudinal design with a unique obstetrical population, this study provides a very specific lens with which to understand the power of secure attachment in the face of adversity. A variety of dimensions of stress were ascertained via the PSI-SF. These analyses revealed that maternal trauma was significantly associated with total postpartum parenting stress at twelve months, as well as postpartum parenting distress. Maternal trauma seemed to exert a weaker effect on parent-child dysfunction or mothers' perceptions of their child's temperament. Postpartum depression, meanwhile, was uniformly significantly associated with all subdomains of the PSI-SF including the total score. The postpartum depression effects were therefore consistent with the findings in Chapter 3.

There were also several limitations to this study. The sample size for the Strange Situation procedure (N = 184) was a fraction of the total sample size for Cohort 2 (N = 255), which could have skewed the results. Additionally, the analysis could have been strengthened had both cohorts completed the Strange Situation procedure: although Cohort 1 examined adult attachment in the offspring population, it did not include a measure of attachment on the mother-

infant dyads. Finally, this paper did not examine the full mosaic of caregivers present in each child's life who were contributing to their health and wellbeing - this is especially relevant given the fact that younger parents tend to rely more heavily on family and friends to help offset the considerable demands of parenting. However, this limitation is somewhat mitigated by the design of this study - in other words, its use of the Strange Situation procedure to measure attachment specifically between the child and their biological mother.

The preservation of secure attachment even in the face of considerable early childhood adversity - and in the presence of increased stress - highlights attachment as a potential mechanism for mitigating the intergenerational transfer of trauma. The relatively high proportion of young mothers with secure attachment in this sample demonstrates the potential for young caregivers to form strong bonds with their infants may be underestimated or even dismissed. Future research could include analyses that examine the relative reach of the resiliency in mother-infant dyads in which both (a) the mothers have elevated trauma histories, and (b) the mother-infant dyad is securely attached, to determine whether this trajectory holds for early childhood behavioral outcomes. In other words, it would be important to examine whether the protective influence of a secure attachment translates into lower rates of internalizing and externalizing behavioral problems in the offspring, even in the context of high maternal trauma.

Table 1: Associations Between Risk Factors and Attachment Classification

Risk factors	% with risk factor in total sample	A (Insecure-Avoidant), n = 36	B (Secure), n = 83	C (Insecure-Ambivalent), n = 26	D (Disorganized), n = 39	X^2 (Securely attached = 1, Not securely attached = 0)
Maternal Mental Health and Trauma						
Depression	44%	47%	40%	38%	54%	1.11
LC 1	36%	33%	41%	31%	33%	1.35
LC 2	17%	25%	16%	12%	18%	0.31
LC 3	46%	42%	43%	58%	49%	0.48

Maternal Contextual Risk						
Maternal age	60%	61%	6%	69%	54%	0.00
Education	74%	78%	73%	77%	72%	0.07
Employment	73%	75%	72%	65%	82%	0.21
Child Characteristics						
Child Sex (Females)	43%	42%	45%	42%	41%	0.17

Maternal age = 16 or younger at the time of the baby's birth; LC 1: Parental Stressors Group; LC 2: Violence and Abuse Group; LC 3: Invalidating Environment Group

Table 2: Differences Between Cohort 2 and the Attachment Sub-Sample

Variable	Cohort 2: Full Sample (N=255)		Cohort 2: Analytic Sample (N=184)		*t (cont.) or X^2 (cat.)*	*p*
	M or %	*SD*	*M or %*	*SD*		
Age	16.04	1.02	16.06	0.99	-0.17	0.86
Employed	73%	-	74%	-	0.32	0.57
HS diploma or GED	87%	-	74%	-	9.58	0.00
Depression at 6 months	16.71	11.39	16.22	11.21	0.43	0.66
Child Sex (Female)	43%		43%		3.89	0.74

Table 3: Logistic Regression of Secure Attachment at 12 Months

Variable	Estimate	*OR*	95% CI		*p*
			LL	*UL*	
Intercept	-0.02	0.98	0.00	328.19	0.99
Maternal Age	0.02	1.01	0.73	1.39	0.91
H.S. Diploma or GED	-0.10	0.95	0.46	1.98	0.80
Employed	-0.15	0.89	0.45	1.74	0.65
Child Sex	0.12	1.13	0.62	2.06	0.69
6 Month Depression	-0.33	0.72	0.39	1.31	0.28
LC 1	0.35	1.41	0.39	1.31	0.37
LC 2	-0.13	0.88	0.67	3.03	0.82

Table 4: Linear Regression of Postpartum Stress Outcomes

	PSI: Total			***PSI: Distress Subscale***			***PSI: Dysfunction Subscale***			***PSI: Difficult Subscale***		
Variable	*b*	SE	*t*	*b*	SE	*t*	*b*	SE	*t*	*b*	SE	*t*
Intercept	77.0	20.0	3.85***	31.0	9.03	3.43***	13.8	7.72	1.79 .	32.1	8.26	0.00***
Age	-0.72	1.11	0.65	-0.49	0.50	0.97	0.14	0.43	0.34	-0.38	0.46	0.82
HS grad	-0.47	2.58	0.18	0.18	1.17	0.15	0.51	1.00	0.52	-1.16	1.07	1.09
Employed	0.99	2.46	0.40	0.53	1.11	0.48	0.33	0.95	0.35	0.13	1.02	0.13
LC 1 Ref: LC 3	5.31	2.65	2.00*	2.77	1.20	2.31*	0.45	1.02	0.44	2.09	1.10	1.90 .
LC 2 Ref: LC 3	1.31	3.90	0.34	4.43	1.76	2.51*	-1.95	1.51	1.29	-1.17	1.61	0.73
Postpartum Depression	13.4	2.14	6.26***	6.36	0.97	6.58***	3.06	0.83	3.70***	3.95	0.88	0.00***

*Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1*

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Conclusion

Much has changed in our country in the short time since I submitted the prospectus for this dissertation. I was sitting at my kitchen table, 36 weeks pregnant and typing away at the introduction for Chapter 4, when a notification flashed on my phone that Roe had finally been overturned. Just two weeks prior, NPR had published a story on the rising abortion rate in the US over the past two years. In the same months, we saw a renewed wave of gun violence targeting children, adolescents, and BIPOC that both emphasized the dire need for caring for and supporting the mental health of our young people while also scapegoating mental health as a larger threat to our society than the NRA, white supremacists, and capitalism-driven political agendas. If I felt that, at the start of writing this dissertation, our country was balanced on a precipice, it is hard not to feel now that we have slipped off the edge and are trending toward a free-fall.

And yet, it is more important than ever that we each do what we can to uplift one another, lean into community, and move forward together. While research can run the risk of being an esoteric endeavor, we have an opportunity to partner with communities and use evidence-based methods to promote the health and wellbeing of those who are most vulnerable to harm within the patriarchal, ableist, racist, and heteronormative norms in our country. This dissertation sought to trace the trajectory of trauma's effects across two generations, and in doing so highlighted the ultimate resiliency of adolescent mothers and their ability to provide sensitive, loving care to their infants despite facing socioeconomic, structural, and psychological challenges.

Summary of Principal Findings

In this dissertation, I sought to emphasize the utility in an expanded definition of childhood trauma by conducting a latent class analysis of childhood adversity among a longitudinal cohort of adolescent mothers, and examining the extent to which these traumatic experiences impacted both their prenatal and postpartum mood as well as early indicators of attachment or bonding with their infants. I hypothesized that the latent class analysis would reveal groupings different from a *trauma* versus *no-trauma* group, and that individuals' traumatic experiences would have an independent effect on perinatal mental health as well as on mother-infant attachment.

Main findings of Paper 1

Paper 1 was a latent class analysis of trauma exposure among the adolescent mothers in both Cohort 1 and Cohort 2. I operationalized childhood trauma as adverse experiences occurring between the ages of birth and eighteen that spanned a range of socioeconomic, structural, and interpersonal stressors. The latent class analysis resulted in a three-class solution. Based on the adverse events with the highest probabilities in each of the latent class groupings, I termed the classes as the following: the Parental Stressors Class (Latent Class 1), the Violence and Abuse Class (Latent Class 2), and the Invalidating Environment Class (Latent Class 3). Adolescents who were most likely to be assigned to the Parental Stressors Class experienced adverse events that were primarily related to their parents - for instance, experiencing parental divorce or a parent who was incarcerated. Individuals most likely to be assigned to the Violence and Abuse Class were overwhelmingly more likely to have experienced sexual assault or interpersonal violence. Finally, individuals in the Invalidating Environment Class tended to experience emotional abuse from within their family of origin.

Main findings of Paper 2

Paper 2 used the results from the latent class analysis to examine the impact of childhood trauma exposure on postpartum depression. I used the posterior probabilities from the latent class solution and fed these as predictors into a linear regression model with the dependent variables set as depression at six, twelve, and eighteen months postpartum. I included antenatal depression as a covariate in each of the models to account for the impact of antenatal depression on postpartum depression. Across both Cohort 1 and Cohort 2, childhood trauma exhibited a significant effect on postpartum depression distinct from the effect of antenatal depression.

Main findings of Paper 3

The final paper, Paper 3, used a similar method to Paper 2 to examine the impact of childhood trauma exposure on mother-infant attachment at twelve months. As with Paper 2, I used the posterior probabilities from the latent class analysis as predictors in a logistic regression with the dependent variable as secure attachment at twelve months. This paper used only the adolescents from Cohort 2, since Cohort 1 did not complete the Strange Situation Procedure at twelve months. This analysis revealed no association between childhood trauma exposure and mother-infant attachment. However, subsequent analyses did reveal significant associations between both childhood trauma exposure and postpartum depression on parenting stress at twelve months postpartum.

Implications and Future Directions

Social Justice Implications

This work holds several social justice implications, which have intensified in the aftermath of Roe being struck down this past summer. Even before the decision by the supreme court, disparities in access to, and quality of, perinatal health and mental health care meant that childbearing individuals of color had worse outcomes when compared with their white peers in

the U.S. Roe's overturn will undoubtedly widen these disparities and disproportionately affect childbearing individuals of color. This withdrawal of support around protections for childbearing individuals is antithetical to trauma-informed care and will undoubtedly increase rates of anxiety, depression, and trauma-related disorders during the perinatal period. It is also possible that the Roe reversal will stall and even reverse the steady decline we have seen in adolescent pregnancies. All this means that it is more important than ever to partner with communities and engage in community-driven research methods to increase mental health support for marginalized communities. It will also mean continued advocacy and action to change the political landscape. This work also holds implications regarding social justice and childhood trauma, its causes, and its correlates. One of the Social Work Grand Challenges, established in 2015 by the American Academy of Social Work and Social Welfare, was to ensure healthy development for all youth. This grand challenge named childhood trauma specifically, stating that "behavioral health problems in childhood and adolescence often have lifelong repercussions on physical, emotional, and financial wellbeing" (Coalition for the Promotion of Behavioral Health, 2021). These lifelong repercussions are multifactorial in nature, and we must devise preventive interventions that not only address the entire life course but that also contain structural-level, community-level, and individual-level components if we want to move the needle in a meaningful way on promoting behavioral health from childhood through to early parenthood. Research such as the studies included in this dissertation will hopefully continue to focus on elucidating the most important drivers of these lifelong repercussions, so that the preventive interventions we devise are tailored specifically to those mechanisms. While not the focus of the studies included in this dissertation, an important consideration to keep in mind when addressing childhood trauma and lifelong behavioral health concerns is the interplay

between the biological and environmental - for instance, much of what Dr. Nadine Burke-Harris talks about in her book *The Deepest Well.* Our bodies' responses to trauma - the inflammatory responses and even the expression of underlying conditions that are determined, in part, by variations in our genes - are not static, are dynamic, clearly occur in the face of adversity, food insecurity, abuse and neglect, and are by definition preventable - in some cases, reversible. Individuals who exist in adversity and face racial abuse and neglect, food insecurity, and socioeconomic hardship are all at much greater risk for these inflammatory and epigenetic responses which we now know play a role in the vast majority of medical and psychiatric illness. Research to support this theory is already being carried out: a recent publication found that childbearing individuals exposed to adversity (specifically, poverty) during the prenatal period had measurable effects on infant brain development during the first month of life (Triplett, Lean, & Parikh, 2022). As social workers, we are called to prevent the accumulation of these biological scars by way of ameliorating the environmental stressors that collide with them.

Clinical Implications

In addition to the social justice implications, this work also holds several clinical implications for social work practice with childbearing individuals and their children. As hypothesized in the introduction to this dissertation - as well as the introductions to papers two and three - it appears that childhood trauma exerts a distinct effect on perinatal and postpartum depression, as well as postpartum parenting stress. Two of the most popular evidence-based interventions for addressing perinatal depression - cognitive behavioral therapy (CBT) and interpersonal psychotherapy (IPT) - do not include a trauma-focused component. It is possible that we are missing an opportunity to address trauma-related symptoms if we are working with perinatal individuals impacted by perinatal stress and depression without utilizing a modality

with the flexibility to incorporate a trauma component. From a modality standpoint, much work needs to be done to enhance the evidence-base of interventions that can address trauma-related symptoms without relying on the existence of an 'index trauma event'. A great example of this is Melanie Harned's adaptation of dialectical behavioral therapy (DBT) with a trauma focus. A preliminary step in this direction would be to invest in research that examines the variability in clinical presentations among perinatal individuals seeking counseling: we need a better understanding of the prevalence of trauma-related and other psychological conditions in this population. An intermediary step would be to increase access for perinatal individuals to interventions that can address a broader spectrum of symptoms, rather than a narrow focus on depression or anxiety. Currently, very few programs exist that offer evidence-based treatments such as DBT, functional analytic psychotherapy (FAP), or acceptance and commitment therapy (ACT), all of which can address trauma-related symptoms such as emotion dsyregulation, shame, and impulsivity. Once we have a better understanding of the prevalence of trauma-related and other psychological conditions among perinatal individuals, we will be able to better tailor our interventions in such a way that will hopefully address root causes of these conditions rather than more temporary brief intervention approaches.

Conclusion

The papers comprising this dissertation examined the nature of childhood traumatic experiences among adolescent mothers, and investigated the ways in which those traumatic experiences impacted perinatal depression and postpartum maternal attachment and parenting stress. Time will tell if these papers gain relevance because of a creeping increase in adolescent pregnancies and upswing in perinatal mental health conditions in the wake of the overturn of Roe in the United States. Collectively, these papers found that childhood traumatic experiences can

be classified into groups pertaining to stressors affecting parents, stressors affecting mothers, and stressors that have to do with familial interpersonal functioning; that childhood trauma exerts an independent effect on perinatal depression; and that childhood trauma seems to affect postpartum stress but not early maternal-infant attachment. It is no small feat to parent a child, much less during one's adolescence and in the context of significant adversity. Increasing wider access to trauma-informed interventions and investing in communities could support adolescent mothers during an important time, and in the best case scenario could promote support for not one but two generations.

Appendix

Table 1
Results of Differences between Cohorts on Variables Included in the Model

Variable	Cohort 1		Cohort 2		*t*	*p*	Cohen's *d*
	M	*SD*	*M*	*SD*			
Age	16.1	1.01	16.2	1.02	0.58	0.56	0.05
Baseline Depression	0.00	1.0	0.00	1.0	0.00	1.0	0.00
Postpartum Depression, 6 months	0.00	1.0	0.00	1.0	0.00	1.0	0.00
Postpartum Depression, 12 months	0.00	1.0	0.00	1.0	0.00	1.0	0.00
Postpartum Depression, 18 months	0.00	1.0	0.00	1.0	0.00	1.0	0.00
Latent Class 1*	0.53	0.43	0.41	0.44		0.00	
Latent Class 2*	0.21	0.33	0.16	0.29		0.53	
Latent Class 3*	0.25	0.35	0.43	0.43		0.00	

***** *mann-whitney u test*

Table 2

Cohort 1 Baseline associations

Variable	Class 1		Class 2		Class 3		F(1)	p
	M	*SD*	*M*	*SD*	*M*	*SD*		
Baseline depression	0.09	0.95	0.13	1.07	-0.31	0.99	5.58	0.01
Postpartum depression, 6 months	0.17	1.03	0.02	0.94	-0.39	0.88	12.67	0.00
Postpartum depression, 12 months	0.27	0.98	-0.05	1.07	-0.53	0.74	27.48	0.00
Postpartum depression, 18 months	0.25	1.07	-0.00	0.89	-0.54	0.68	26.77	0.00

Cohort 2 Baseline associations

Variable	Class 1		Class 2		Class 3		F(1)	p
	M	*SD*	*M*	*SD*	*M*	*SD*		
Baseline depression	0.26	1.05	-0.16	0.90	-0.18	0.95	10.48	0.00
Postpartum depression, 6 months	0.29	1.13	0.03	0.80	-0.26	0.88	16.58	0.00
Postpartum depression, 12 months	0.23	1.10	-0.01	0.9	-0.20	0.90	9.11	0.00
Postpartum depression, 18 months	0.22	1.11	0.05	0.92	-0.23	0.87	10.62	0.00

Measures

Symptom Checklist-90-Revised

12 SCL-90

39. For the next series of questions, please use CARD D for your responses. I am going to read a list of problems people sometimes have. For each problem that I read, please tell me how much that problem has bothered or distressed you during the past week including today.

SCL-90

			Not at all	A little bit	Moder-ately	Quite a bit	Extremely
AANX1	a.	Nervousness or shakiness inside	0	1	2	3	4
ADEP1	b.	Loss of sexual interest or pleasure	0	1	2	3	4
AINT1	c.	Feeling critical of others	0	1	2	3	4
AHOST1	d.	Feeling easily annoyed or irritated	0	1	2	3	4
ADEP2	e.	Feeling low in energy or slowed down	0	1	2	3	4
ADEP3	f.	Thoughts of ending your life	0	1	2	3	4
AANX2	g.	Trembling	0	1	2	3	4
ADEP4	h.	Crying easily	0	1	2	3	4
AINT2	i.	Feeling shy or uneasy with the opposite sex	0	1	2	3	4
ADEP5	j.	Feelings of being trapped or caught	0	1	2	3	4
AANX3	k.	Suddenly scared for no reason	0	1	2	3	4
AHOST2	l.	Temper outbursts you cannot control	0	1	2	3	4
ADEP6	m.	Blaming yourself for things	0	1	2	3	4
ADEP7	n.	Feeling lonely	0	1	2	3	4
ADEP8	o.	Feeling blue	0	1	2	3	4
ADEP9	p.	Worrying too much about things	0	1	2	3	4
ADEP10	q.	Feeling no interest in things	0	1	2	3	4
AINT3	r.	Your feelings being easily hurt	0	1	2	3	4
AINT4	s.	Feeling others do not understand you or are unsympathetic	0	1	2	3	4

Center for Epidemiological Studies Depression

Table 1. CES-D Scale

INSTRUCTIONS FOR QUESTIONS: Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week. HAND CARD A.

Rarely or None of the Time (Less than 1 Day)
Some or a Little of the Time (1-2 Days)
Occasionally or a Moderate Amount of Time (3-4 Days)
Most or All of the Time (5-7 Days)

During the past week:

1. I was bothered by things that usually don't bother me.
2. I did not feel like eating; my appetite was poor.
3. I felt that I could not shake off the blues even with help from my family or friends.
4. I felt that I was just as good as other people.
5. I had trouble keeping my mind on what I was doing.
6. I felt depressed.
7. I felt that everything I did was an effort.
8. I felt hopeful about the future.
9. I thought my life had been a failure.
10. I felt fearful.
11. My sleep was restless.
12. I was happy.
13. I talked less than usual.
14. I felt lonely.
15. People were unfriendly.
16. I enjoyed life.
17. I had crying spells.
18. I felt sad.
19. I felt that people dislike me.
20. I could not get "going."