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Family Risk Exposure Profiles During Early Childhood: Developmental Processes and Adolescent Well-Being

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Abstract

Although prior work indicates that exposure to multiple family risk factors negatively impacts adjustment in childhood and adolescence, few studies have examined whether children in high-risk families transition in and out of adversity during early childhood and whether patterns of change matter for adjustment in adolescence. Using data from a sample of 216 caregiver-child dyads participating in a study of prenatal cocaine exposure (116 exposed and 100 non-exposed; 50.9% girls), we used latent transition analysis to identify distinct profiles of early exposure to caregiver substance use (SU) and SU-related familial risk (caregiver psychological distress, exposure to violence, harshness, and low sensitivity) and the association between these profiles and adolescent well-being (i.e., hope, happiness, and life satisfaction). Assessments occurred when children were 13, 24, 36, and 48 months and during kindergarten (M_{months} = 66.16, SD = 4.47) and early adolescence (M_{years} = 13.26, SD = 0.88). Caregivers self-identified as 72.09% Black, 15.81% White, 10.23% Hispanic/Latinx, 1.40% other, and 0.47% American Indian. Four profiles of varying levels of exposure to caregiver SU and SU-related risks were identified from infancy to kindergarten: *SU/family risks*, *no SU/low family risks*, *SU/negative parenting*, and *SU/low family risks*. Most children stayed in the same profile (64.2%), while the rest transitioned between profiles. Children exposed to caregiver SU and family adversity had lower positive outcomes in adolescence. Stable membership in the *SU/family risks* profile had significant maladaptive consequences on adolescent well-being. Implications for research and the design of tailored interventions to promote well-being among at-risk youth are discussed.

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Keywords

Adolescence; Caregiver substance use; Early adversity; Latent transition analysis

Introduction

Adolescence is a critical transitional period marked by significant physical, cognitive, and socioemotional changes that are often associated with increased stress (Avedissian & Alayan, 2021). At the same time, difficulties meeting developmental tasks during this transitional age can have a significant and sustained effect on the future well-being of these young people, with more than 75% of psychiatric disorders presenting between the ages of 11 and 18 years (Costello et al., 2011; McGorry & Van Os, 2013). Considering these risks, it is not surprising that, in recent years, increased attention has been paid to the study of adolescents' well-being, commonly defined as their overall life satisfaction, expressed happiness, and optimism about the future (Diener et al., 1999; Ross et al., 2020; Steptoe et al., 2015). Much is known about adult well-being and its antecedents and consequences. However, less attention has been paid to the developmental consequences of adolescent well-being, with a small but growing interest in the study of early antecedents of adolescent well-being (Avedissian & Alayan, 2021). The current study aims to address this gap by examining whether exposure to various combinations of established family risks for maladjustment in childhood is differentially predictive of well-being in early adolescence.

Compelling evidence suggests that social disadvantage and adverse experiences negatively impact the well-being of children and adolescents (Cicchetti, 1993; Edleson, 1999; Obradović et al., 2012). Research has shown that adolescents' exposure to multiple co-occurring risk factors in infancy and early childhood (e.g., caregiver depression, harsh parenting, interparental violence) puts them at increased risk of maladjustment as compared to those who are exposed to fewer to no risks (Appleyard et al., 2005; Evans et al., 2013; Sameroff et al., 1993). Yet, little is known about patterns of change and stability in cumulative risk exposure during early childhood, and even less is known about how these patterns of change are related to adolescent well-being. Thus, in this study, we examine distinct profiles of family risks for maladjustment during infancy and early childhood. We aim to identify patterns of change and stability of risk exposure within individual children over time in a low-income diverse sample at high risk due to prenatal substance use (SU), who are likely to experience multiple co-occurring risks. We also assess whether membership in specific family risk profiles and transition between profiles across early childhood influence adolescent well-being, namely life satisfaction, happiness, and hope. Understanding these variations can aid in the development of interventions designed to provide targeted support to at-risk families.

Caregiver SU and Rearing Environmental Risk

Caregivers' prenatal and continued postnatal SU may place caregivers and their children at risk for adverse outcomes that result in considerable financial public costs (Velleman & Templeton, 2016; Wendell, 2013). It is well-established that prenatal SU exposure may lead to brain changes that are associated with emotional and behavioral regulation (Minnes

et al., 2011). Indeed, prenatal SU exposure may compromise children's future adjustment in multiple domains, including self-regulatory skills (Bridgett & Mayes, 2011; Eiden et al., 2015; Minnes et al., 2016), behavior problems (Eiden et al., 2011a; Min et al., 2014), and cognitive functioning (e.g., IQ and school achievement; Singer et al., 2008). Prenatal exposure is often a marker of higher levels of continued postnatal exposure (Eiden et al., 2007; Shisler et al., 2016). Furthermore, many developmental outcomes of children exposed to SU postnatally are also at high risk for being significantly compromised. These children are at increased risk for behavioral and emotional problems, as well as poorer cognitive ability and academic performance in childhood and adolescence (Hussong et al., 2007; Khemiri et al., 2020). Children exposed to continued caregiver SU are also more likely to use substances in adolescence than those who are not exposed (Lieb et al., 2002; Walden et al., 2007). Together, these results support the notion that exposure to caregiver SU may place children at greater risk of maladaptation across development. There is less clarity, however, on the degree to which exposure to caregiver postnatal SU in early childhood is associated with compromised well-being in adolescence. Given heightened risks, a better understanding of the factors that underlie long-term adverse health and developmental outcomes of these children is needed.

Caregivers' SU often does not occur in isolation. Indeed, caregivers' SU is linked to other risk factors in the rearing environment that subsequently confer risk for the caregiver-child interactions and children's adjustment (Hatzis et al., 2017; Smith et al., 2016). For instance, postnatal maternal SU is related to higher rates of psychological distress (see Ross & Dennis (2009) for review), which, in turn, may negatively impact child adjustment by affecting optimal parenting behaviors. A large body of work has demonstrated that maternal psychological distress is associated with higher levels of harsh parenting and difficulties maintaining sensitive parenting strategies, as well as with higher risk for child maladjustment (Goodman et al., 2011; Kelley et al., 2015; Murray et al., 2011; Vera et al., 2012). Moreover, the risk for adverse outcomes is especially high when maternal psychological distress occurs in early childhood (Bureau et al., 2009; Goodman et al., 2011), suggesting it is a sensitive period. Children whose parents engage in SU are also more likely to experience other stressors, including exposure to violence (Whitaker et al., 2006) that may be detrimental to their adjustment. Prior research using a sample at high risk due to caregiver SU found that child exposure to violence was related to more behavior problems (Veira et al., 2014). Moreover, while caregiver-sensitive parenting buffered the effects of exposure to violence, harshness exacerbated the association. This work suggests that caregiver SU and caregiving risks can have additive as well as synergistic effects that place children at higher risk for maladjustment throughout development. However, it is less clear how caregiver SU and the myriad of SU-related risks interplay within individuals over time to predict child functioning. In the current study, we examine how exposure to caregivers' continued SU and multiple SU-related risks during early childhood contribute to adolescent well-being.

Family Risks and Family Risk Profiles

Developmental psychopathologists have long aimed to understand how exposure to multiple, co-occurring familial, environmental (e.g., neighborhood, school), and socioeconomic risk factors relate to child adjustment (Cicchetti, 1993; Sroufe, 1990). However, there have been

conceptual and methodological challenges to modeling co-occurring risks (Burchinal et al., 2000; Evans et al., 2013). Two commonly used approaches have been the variable-centered and the person-centered approaches. Variable-centered approaches allow for the examination of how individual risk factors or accumulation of risks accounts for poor adjustment outcomes (Magnusson & Bergman, 1988; Sameroff et al., 1993). Using this approach, Rutter (1979) developed the cumulative risk index to test the hypothesis that it is the accumulation of multiple coexisting risks, not the content of a particular risk factor, that is the key to children's adjustment. The cumulative risk index, which aggregates across the multiple risks to which children are exposed, has well-established links to child maladaptive outcomes in multiple domains, such as behavioral, cognitive, and socioemotional development (e.g., Appleyard et al., 2005; Burchinal et al., 2000; Deater-Deckard et al., 1998; Evans et al., 2013; Sameroff et al., 1993; Trentacosta et al., 2008). However, this conceptualization of cumulative risk fails to consider that risk factors may vary in their respective strength and impacts, or that different combinations of risk factors may have important implications for child outcomes (Burchinal et al., 2000; Evans et al., 2013). For example, caregiver continued SU may be associated with interparental violence and caregiver depression for one group of children but with harsh parenting and low warmth for others. According to this cumulative risk approach, which assumes all risk factors are equally impactful, both groups of children would have a cumulative risk index score of three when, in fact, the unique combinations of co-occurring risk factors may be differentially related to child adjustment.

Increasingly, researchers have used person-centered approaches, such as latent class analysis (LCA; Collins & Lanza, 2010), to model cumulative risk. These approaches allow researchers to identify subgroups of individuals based on patterns of associations across multiple risk factors and, therefore, may provide unique insight into the lived experiences of children exposed to co-occurring risks. Most studies using LCA to understand heterogeneity in the constellation of socioeconomic and familial risk factors to which children are exposed have identified between three and six profiles (Cooper & Lanza, 2014; Copeland et al., 2009; Herbers et al., 2019; Lanza et al., 2010; Parra et al., 2006; Pratt et al., 2016; Rhoades et al., 2011; Roy & Raver, 2014).

Although prior studies have varied in terms of the number of profiles identified, the developmental periods under consideration, the sample characteristics, and the risk indices, there appears to be some consistency. First, most studies identified a low-risk profile (comprising about 32–78% of community samples and 11–47% of higher-risk samples), a high-risk profile (comprising about 5–38% of higher-risk samples and less than 10% of community samples), and one or more profiles characterized by various combinations of poverty, family dysfunction, and caregiver risk characteristics. For example, among six distinct family risk profiles, Copeland and colleagues (2009) found a *low risk: no risk* profile characterized by low levels of all risk factors, a *high risk: poor relations/parental dysfunction* profile characterized by high levels of parent–child conflict, interparental problems, and parental mental illness and criminality, and several mixed profiles including one with high rates of poverty and parental criminality but low levels of parent–child conflict, interparental problems, and parental depression.

Prior research has also utilized person-centered approaches to examine how specific patterns put children at risk of poor adjustment in early childhood (Ettekal et al., 2019; Pratt et al., 2016; Rhoades et al., 2011), middle childhood (Herbers et al., 2019; Lanza et al., 2010; Roy & Raver, 2014), and adolescence (Parra et al., 2006). In general, these studies find that profiles characterized by high family risk are associated with more negative developmental outcomes such as higher levels of behavioral problems and lower levels of academic achievement and school readiness (Lanza et al., 2010; Pratt et al., 2016). However, unique familial risk constellations are differently predictive of outcomes with profiles characterized by socioeconomic risk related to worse cognitive and academic outcomes, and profiles with high family dysfunction related to behavioral problems (e.g., Lanza et al., 2010; Pratt et al., 2016; Roy & Raver, 2014). To our knowledge, this approach has not been used to examine how multiple risk factors coalesce in infancy and early childhood to predict well-being in adolescence in a high-risk sample. In this study, we examine whether there is substantial heterogeneity in the combinations of key caregiving environmental risks (caregiver SU, exposure to violence, caregiver psychological distress, harsh parenting, and low caregiver sensitivity) to which children in a high-risk sample are exposed. We also examined how children's early exposure to unique combinations of risk in infancy and early childhood are differentially related to their well-being in adolescence.

We focused on understanding the impact of early risk exposure, including the age of exposure, on adolescent well-being for several reasons. First, there is evidence that early childhood, particularly the first three years, constitutes a sensitive period for exposure to adversity. Indeed, research shows that early adverse rearing experiences pose risks to health and well-being in adolescence (Raby et al., 2015; Shonkoff et al., 2012). Further support for the importance of early experience comes from work, showing that transitioning toward increased adversity between 9 and 36 months is associated with more risk behaviors and worse mental health outcomes in adolescence (Wadman et al., 2020). Finally, given that adolescence is a time of marked increases in stress (Avedissian & Alayan, 2021) and the emergence of mood disorders (Costello et al., 2011; McGorry & Van Os, 2013), focusing on differential impacts of unique risk constellations and transitions on adolescent well-being is particularly warranted as these efforts may have implications for early targeted prevention for at-risk groups.

Family Risks and Change Across Time

While the links between cumulative risk and children's maladaptive outcomes are well-established (Appleyard et al., 2005; Evans et al., 2013), research examining how the timing (i.e., infancy, toddlerhood, preschool) and chronicity (i.e., transient versus persistent) of cumulative exposure to risk influence developmental outcomes continues to be limited, especially longitudinal research using person-centered approaches. Evidence from studies using variable-centered approaches suggests that children exposed to adversity early in development are at risk for poorer adjustment as compared to children exposed later (Duncan et al., 1998; Shonkoff et al., 2012). Appleyard & colleagues (2004) examined the impact of cumulative risk factors in early and middle childhood on behavior problems in adolescence, showing that cumulative risk exposure during the first 5 years of life was more strongly related to behavior problems in adolescence than was cumulative risk exposure in

middle childhood. A related line of investigation suggests that children exposed to persistent cumulative risk are at increased risk for maladjustment than children who experience intermittent or short-term risks (Ackerman et al., 1999; Gutman et al., 2019; Letourneau et al., 2013). There are, however, limitations to the prior work in this area. Specifically, given that the risk index created using a variable-centered cumulative risk approach assumes that indicators are equally weighted and combine as a unidimensional construct of "adversity," studies using this approach are only able to shed light on whether the overall number of risks, rather than the specific types of risk, remains stable or changes over time. A better understanding of how variability in the types of cumulative risk exposure over time relates to adjustment in adolescence may contribute to the development of tailored prevention and intervention efforts.

More recently, researchers have utilized latent transition analysis (LTA; Collins & Lanza, 2010; Lanza & Collins, 2008) to estimate patterns of stability and change in cumulative risk exposure from a person-centered perspective. Some studies have utilized this approach to examine how distinct constellations of early risk factors and transitions over time relate to outcomes in adolescents (Dierkhising et al., 2019; Dunn et al., 2011). Overall, these studies indicate that risk profile membership is fairly stable (55 to 86%) and that risk exposure in early life is associated with adverse outcomes in adolescence. However, these studies have been limited by retrospective reporting of early risks, restricting their ability to examine transitions on shorter time scales (e.g., annually or biannually). Evidence from a longitudinal study using LTA showed that five profiles of familial and sociodemographic risk remained stable from infancy to middle childhood and that children who were continuously in the low-risk group exhibited more positive social behavior than children who were continuously in the high-risk group (Yan et al., 2019). Evidence from studies utilizing longitudinal data to examine whether transitions in exposure to early family adversity act to protect or exacerbate maladjustment in adolescence is more limited. One exception is a study that examined distinct profiles of familial adversity across early childhood (i.e., at 9, 36, and 60 months) and the impact of these profiles on adolescent adjustment (Wadman et al., 2020). Wadman et al. (2020) identified four profiles (i.e., low-adversity, high-adversity, two-caregiver/economic hardship, and two-parent/high-conflict) and found that 72% of the sample remained stable in their profile membership. Furthermore, children who transitioned from the high-adversity profile to the low-adversity profile by 36 months had higher self-esteem than children who remained in the high-adversity profile across time. It remains unclear whether children in high-risk families transition in and out of adversity and whether patterns of change predict adjustment outcomes in adolescence.

The Current Study

The purpose of this longitudinal study is to expand on previous research by examining whether unique profiles or subgroups of caregiver SU and SU-related family risks for maladjustment in early childhood are differentially predictive of well-being in early adolescence. For risk profiles, we included caregiver SU as an indicator, given that this sample was at risk due to high rates of prenatal SU exposure and the links between prenatal and continued postnatal SU. Additional risk factors were identified based on prior theoretical and empirical work on early rearing environmental risk with a particular

focus on risk factors that commonly co-occur with caregiver-continued SU (e.g., Ross & Dennis, 2009; Whitaker et al., 2006). These risk factors included caregiver psychological distress, exposure to violence, harsh parenting, and low parental sensitivity. Although some prior work on cumulative risks has included parental partner status and levels of economic (dis)advantage as indicators, we did not include them in the current study as most of the caregivers in the sample were single and low-income, and, therefore, these indicators showed low variability.

This study has four aims. First, based on the literature reviewed above, we expect to find at least three distinct profiles characterized by: (1) high levels of postnatal caregiver SU and SU-related risks, (2) relatively low levels of caregiver SU and SU-related risks, and (3) a combination of caregiver SU and family dysfunction or parenting risks (H1a). In addition, given that previous work has found more diverse profiles of risk in high-risk samples (e.g., Herbers et al., 2019), we also expect that the prevalence rates for the identified profiles will be relatively similar within time (H1b). However, we do expect there will be variability in the prevalence of risk profile membership over time (H1c).

Second, we examine differences in family risk profiles by prenatal cocaine use status. We chose to examine differences based on cocaine group status since this sample was recruited based on prenatal cocaine use (see Methods) and because cocaine use status may be related to unique constellation of risk characteristics (Eiden et al., 2007). However, most women using cocaine in pregnancy also use other substances (Eiden et al., 2007; Minnes et al., 2011). Based on work indicating that mothers who used substances during pregnancy were more likely to misuse substances postnatally (Eiden et al., 2007; Shisler et al., 2016), profiles characterized by high levels of caregiver SU were expected to be more prevalent for children prenatally exposed to cocaine than children in the control group (H2). Third, using five waves of data, we investigated how membership in different risk profiles changes from infancy to school entry age. Based on theoretical and empirical work suggesting that risk factor patterns are relatively stable across development (e.g., Caspi et al., 1987; Wadman et al., 2020), we hypothesized that most children's family risk classification profiles would remain stable across the five waves, while some children would transition to another profile (H3a). Overall, we expected prevalence in the multiple co-occurring risk profile to decrease over time (H3b). Finally, we added new insight into risk-adjustment relations by investigating whether risk profile membership and transitions predict adolescents' well-being. Based on prior studies of risk-adjustment relations (e.g Roy & Raver, 2014; Wadman et al., 2020), we hypothesized that higher likelihood of membership over time in a profile characterized by high levels of family risk would be associated with lower levels of hope, happiness, and life satisfaction in early adolescence (H4).

Method

Sample

The sample was a part of an ongoing longitudinal study, examining the effects of prenatal cocaine exposure (PCE) on child development, following children from birth through adolescence. Mothers were recruited between 2001 and 2006 upon giving birth from two urban hospitals, which served primarily lower income and minority populations (see Eiden

et al., (2011b) for full recruitment details). Mothers (N = 4800) were asked to complete a general health and SU screener for initial eligibility. Women were automatically excluded if: (1) maternal age was less than 18 years; (2) they used illicit substances other than cocaine or marijuana during pregnancy; and (3) the infant had significant medical problems at birth [e.g., congenital anomalies, fetal alcohol syndrome (FAS) diagnosis, HIV positive status, genetic disorders, prolonged respiratory distress, or was in critical care for over 48 h]. Of the mothers screened, 340 mother–child dyads were eligible for participation in either the cocaine-exposed (CE) or non-cocaine-exposed (NCE) groups. Approximately 35% of these mothers declined participation, were no longer interested, or did not attend their appointment, resulting in a sample of 220 dyads. Four dyads were further excluded from analyses as two infants were later diagnosed with FAS, one was later diagnosed with shaken baby syndrome, and one infant was severely delayed.

The final sample comprised of 216 caregiver-infant dyads (116 CE, 100 NCE, 50.9% female). The CE and NCE groups were matched on maternal education, race/ethnicity, and infant sex. At recruitment, biological mothers' age ranged from 18 to 42 years (M = 29.53; SD = 6.06; born 1959–1988). Mothers self-identified their race/ethnicity as 72.09% African American, 15.81% European American, 10.23% Hispanic/Latinx, 1.40% other, and 0.47% American Indian. At the time of their first visit, most caregivers were unmarried (86.5%), receiving federal assistance such as Temporary Assistance for Needy Families (75.7%) and Medicaid (69%), and had high school or below education (39.5%). Compared to eligible but not enrolled mothers, participants were more likely to be between 18 and 25 years of age ($p < 0.001$), to have a high school or below-high school education ($p < 0.001$), to be in the cocaine group (the participation rate among the eligible CE group was 91%). Furthermore, most eligible but not enrolled mothers in the CE group had children placed in non-maternal care. No other significant demographic differences were found between eligible versus enrolled participants in either group (Eiden et al., 2011b).

Procedure

The study was approved by the institutional review board of the two hospitals and the university. We obtained informed written consent from all recruited participants, and they were compensated for their time at each visit. Assessments were conducted with the primary caregiver at the time, identified as the adult possessing legal guardianship and accompanying the child. About 21% of children experienced non-biological parental care at some point between birth and kindergarten age. However, the term "mother" or "parent" has been used interchangeably with "caregiver" throughout the manuscript for ease of presentation. Regardless of care and custody arrangements, biological mothers were interviewed at the first visit to obtain self-report of prenatal SU. Data were collected at regular intervals beginning at 4–8 weeks (years 2001–2006) of infant age to late adolescence (years 2018–2020) by trained interviewers. In the current study, we used data collected at child ages of 13, 24, 36, and 48 months, and then at kindergarten age (M = 66.16 months, SD = 4.47) and early adolescence (M = 13.26 years, SD = 0.88). Visits consisted of a combination of interviews, observations of dyad interactions, and child assessments.

Measures

Individual Risk Indices (13 Months–Kindergarten Age)

Caregiver Substance Use (SU): Postnatal SU was assessed using the Timeline Follow-Back Interview (TLFB; Sobell et al., 1986), a widely used and reliable instrument to measure SU frequency. Caregivers were provided a calendar of the past month at the first assessment, dating back to the last assessment for the other postnatal assessments (e.g., at the 24-month assessment, caregivers were given a calendar for the past 12 months) and were asked to identify days of personal interest (i.e., birthdays, gatherings, personal events) as reference points to aid with recall. The TLFB interview yielded data about the number of days used cocaine, the average number of standard drinks consumed, the average number of cigarettes smoked, and the average number of joints smoked. Dichotomized scores were computed by identifying caregivers with any cocaine use, smoking an average of 10 or more cigarettes per day, and consuming four or more standard drinks per day (i.e., binge drinking), indicative of substance abuse or misuse. Descriptive statistics for the individual risk indicators at each assessment are reported in Table 1.

Caregiver Psychological Distress: Caregiver psychological distress was assessed with the Brief Symptom Inventory (BSI; Derogatis, 1993), a commonly used mental health screening measure. The BSI consists of 53 items rated on a 5-point scale that assess a range of symptoms of psychological distress (e.g., depression, anxiety, psychoticism, hostility, and somatization). A global severity index was computed by taking the average score across all items (Cronbach's αs ranged from 0.97 to 0.98). Dichotomized scores were computed by identifying caregivers who had a normed T-Score equal to or greater than 60, indicative that the scores are elevated to the point of clinical concern (see Table 1).

Exposure to Violence: Caregiver engagement and exposure to domestic or community violence were assessed using items from the TLFB (Sobell et al., 1986). While more widely used in SU assessments, the calendar interview method has also been used in measuring exposure to violence (e.g., Fals-Stewart et al., 2004). Using a daily calendar at each assessment (i.e., 13 months through kindergarten age), caregivers were asked about their witnessing, experiencing, and/or perpetrating violence with their domestic partners or other adults, providing data for the total number of days with exposure to violence. Given the bimodal distributions at each time point, dichotomized scores were computed by identifying caregivers who indicated any violence exposure (see Table 1).

Caregiver Harshness and Low Sensitivity: Caregiver parenting was assessed at each time using behavioral observations of the caregiver-child dyad. At 13, 24, 36, and 48 months, caregivers were asked to interact with their children as they would at home for 10 min in a room filled with age-appropriate toys. At the kindergarten-age assessment, caregivers and children decorated a picture frame for 20 min (Kochanska & Murray, 2000). These caregiver-child interactions were videotaped and coded by two research assistants blinded to group status. Coders who were unaware of other information about the families rated the interactions using the Parent–Child Early Relational Assessment (Clark, 1999), consisting of 5-point rating scales with a score of 1, indicating low levels of positive behavior and a score of 5, indicating high levels of positive behaviors.

The harshness scale included items measuring anger, hostile tone of voice, expressed harshness, angry and hostile mood, and displeasure or disapproval or criticism (intraclass correlation coefficients ranged from 0.82 to 0.98). Scale items were reverse coded so that higher scores reflected more harsh behaviors. Caregiver warmth/sensitivity was assessed by items measuring positive affect, enthusiasm and cheerful mood, enjoyment and pleasure, adequate responsiveness to child behavior and cues, amount and quality of positive verbal responses, mediation of external environment, connectedness, and genuine involvement. Scores were reverse coded, such that higher scores reflected more negative parenting (i.e., low sensitivity). Dichotomized scores for each behavior were based on identifying caregivers with scores in the upper quartile, which consisted of scores defined as an area of concern. Inter-rater reliability was conducted on a random selection of 11 to 14% of tapes. Intra-class correlation coefficients for caregiver harshness and sensitivity ranged from 0.82 to 0.98 across time.

Adolescents' Well-Being Indicators (Early Adolescence)

Adolescent Hope: The Children's Hope Scale (CHS; Snyder et al., 1997) is comprised of six items assessing adolescents' perception that their personal goals can be met. The Likert-type self-report CHS measures how closely adolescents perceive each of 6 statements accurately describe them (1 = "*None of the time*" to 6 = "*All of the time*"). The scale is made up of two subscales. The 3-item Pathway Thinking subscale assesses adolescents' belief in their capacity to find multiple ways to reach their goals (e.g., "*When I have a problem, I can come up with lots of ways to solve it*"). The 3-item Agency Thinking subscale assesses adolescents' self-efficacy and motivation to use multiple ways to reach their goals (e.g., "*I think the things I have done in the past will help me in the future*"). An overall hope score was created by summing the raw scores on the 6 items, with possible scores ranging from 6 to 36, with high scores indicating more hope. Psychometric analyses of the CHS have yielded high internal consistency (Cronbach's α ranging from 0.72 to 0.86) and test–retest reliability (estimates ranging from 0.71 to 0.73 over a 1-month interval; Snyder et al., 1997). The Cronbach's α in this study was 0.82.

Adolescent Life Satisfaction: The Brief Multidimensional Student's Life Satisfaction Scale (BMSLSS; Seligson et al., 2003) consists of five items assessing adolescents' satisfaction with respect to the following domains: Family, Friends, School, Self, and Living Environment. Items are rated on a Likert-type scale (1 = "*terrible*" to 7 = "*delighted*"). Raw scores were summed with possible scores ranging from 5 to 35, where high scores denoted higher life satisfaction. Psychometric analyses of the BMSLSS have yielded acceptable internal consistency in EA (total score Cronbach's $\alpha = 0.75$; item-total correlations ranged from 0.65 to 0.73; Seligson et al., 2003). Acceptable test–retest reliability over a 2-week interval has also been reported: coefficients were 0.62 for friends, 0.75 for school, 0.79 for self, 0.80 for living environment, 0.85 for family, and 0.91 for general life satisfaction (Funk et al., 2006). The Cronbach's α in this study was 0.74.

Adolescent Happiness: We used three items from The Subjective Happiness Scale (SHS; Lyubomirsky & Lepper, 1999) to assess adolescents' global subjective happiness. Two items from the SHS evaluate adolescents' views of self and self when compared to others (1 =

"*not a very happy person/less happy*" to 7 = "*a very happy person/more happy*"). The third item describes a happy person and asks respondents the extent to which the characterization describes them (1 = "*not at all*" to 7 = "*a great deal*"). A composite score was created by summing the raw scores with possible scores ranging from 3 (low happiness) to 21 (high happiness). Psychometric analyses of the SHS have yielded good to excellent internal consistency (Cronbach's α ranging from 0.79 to 0.94), as well as good test–retest reliability (in adolescents, stability coefficient was 0.71 over a 3-month interval; Lyubomirsky & Lepper, 1999). The Cronbach's α in this study was 0.76.

Prenatal CE—Prenatal cocaine use was assessed using a combination of urine toxicology, maternal hair samples, self-report using the TLFB, and health screener. Of the 116 mothers in the CE group, 73 (62.9%) had hair samples that tested positive for cocaine during pregnancy, 49 (46.2%) had positive urine toxicologies at delivery, and 56 (48.3%) reported cocaine use on the TLFB. In addition, there were 12 mothers (10.3%) in the CE group who did not have positive hair or urine samples and did not report cocaine use on the TLFB but admitted to having used cocaine in the brief self-report screening instrument administered after delivery. Prenatal cocaine exposure status (0 = NCE, 1 = CE) was defined as any indication of maternal cocaine use in the urine, hair, TLFB, or health screener.

Attrition and Missing Data

Our retention rates were as follows: 85.6% at 13 months, 81.9% at 24 months, 77.3% at 36 months, 75.5% at 48 months, 77.3% at kindergarten age, 74.5% at early adolescence of the 216 families. To avoid issues related to missing data and unequal sample sizes across time, we applied the following procedure for treatment of missing data prior to testing our hypothesis. First, we implemented logistic regression to determine whether participants who were assessed at all occasions differed from those with missing data on any of the variables included in this study (0 = complete data, 1 = missing data). Missingness was positively related to caregiver low sensitivity at 13 months ($\beta = 0.16$, $p = 0.035$), indicating that in families with missing data, caregivers were more likely to engage in low levels of sensitive parenting behaviors than caregivers in families who participated in all six assessments. Furthermore, families with missing data displayed lower harsh ($\beta = -0.19$, $p = 0.017$) and higher sensitivity ($\beta = -0.19$, $p = 0.016$) behaviors at kindergarten age. This indicated that caregivers who participated at all timepoints were more likely to engage in negative parenting behaviors at kindergarten age than caregivers with missing data. There were no other significant differences between families with complete versus missing data. Full-information maximum likelihood estimation was used to accommodate missing data on the indicators and maintain optimal sample size for analyses.

Analytical Plan

To identify adolescent patterns of exposure to caregiver SU and SU-related risks, as well as transitions of these patterns over time (i.e., between 13 months and kindergarten age), we estimated LTA models in SAS using PROC LTA (Lanza et al., 2015). Starting with a two-status model solution, a series of models were estimated, followed by models increasing in the number of statuses to determine the best fitting model (Pastor et al., 2007). We relied on relative measures of fit, including the likelihood-ratio G^2 statistic, Akaike Information

Criterion (AIC; Akaike, 1973), and Bayesian Information Criterion (BIC; Schwarz, 1978) to determine the optimal solution (Collins & Lanza, 2010). The final solution was determined by considering statistical fit information (i.e., smaller AIC and BIC values) along with parsimony, interpretability, and consistency with previous findings.

In the resulting LTA model, the following parameters are estimated: prevalence rates that indicate the proportion of the sample in each profile at 13 months; probabilities of transitions between latent profiles across time (i.e., from 13 to 24 months, 24 to 36 months, 36 to 48 months, and 48 months to kindergarten age); and item-response probabilities that indicate the probability of responding to each level of the indicator items, conditional on latent status membership. To examine change in the profile composition over time, we estimated a model restricted to equality of family risk profiles between the five time points. Measurement invariance was then assessed by comparing a model with item-response probabilities freely estimated to the model restricted to time invariance. If the difference in log-likelihood values is not significant, it would suggest that the models are invariant across time (Meng & Rubin, 1992).

Using the final models, restricted to equality across time, we assigned descriptive names for each pattern of family risk exposure. We examined the composition of the latent profiles by incorporating prenatal CE status as grouping variables. Next, 15 models were estimated to examine the relation between well-being in early adolescence by likelihood of profile membership at each time. Adolescent well-being (hope, happiness, life satisfaction) was assessed in separate models for each of the five time points. Lastly, using ANOVAs, we estimated the differences in adolescent well-being outcomes based on their patterns of profile transitions from infancy to kindergarten age.

Results

Descriptive Statistics

Table 2 shows the bivariate correlations among the individual risk indicators and adolescent well-being (hope, happiness, life satisfaction). Across time, there were several small to moderate concurrent correlations among the five risk indicators. Adolescent hope, happiness, life satisfaction were not significantly correlated with any of the five risk indicators across time.

Unconditional LTA

The fit indices for the 2- to 5-profile models of LTA are presented in Table 3. In considering multiple fit indices, interpretability, parsimony, and compatibility with prior research (e.g., Copeland et al., 2009; Herbers et al., 2019; Wadman et al., 2020), the 4-profile solution was deemed the optimal solution. Next, we tested the stability of the 4-profile model from infancy to kindergarten age by comparing models where profiles (a) were allowed to vary freely across time and (b) were restricted to be equal across time. The likelihood ratio test statistic comparing the two models was not significant ($\Delta 2ll = 94.16$, $df = 80$, $p = 0.133$), indicating similarity in profiles across time. Thus, item-response probabilities were constrained to be equal across time in subsequent analyses. The estimated pattern of these

four profiles is presented in Table 4, and Fig. 1 shows the overall probability of membership in the profiles at each time. The four profiles were labeled to reflect distinct facets of risk exposure:

1. The *SU/family risks* profile was marked by a high probability of exposure to caregiver SU and psychological distress, and a moderate probability of exposure to family violence, harshness, and low sensitivity. It was the fourth most prevalent profile at 13 months (20.66% of children), but this increased to 25% (24 months) and 24% (36 months), respectively, before decreasing to 19% (48 months) and 21% (kindergarten age).
2. The *no SU/low family risks* profile was marked by a low probability of exposure to caregiver SU, caregiver psychological distress, family violence, harshness, or low sensitivity. It was the second most prevalent profile at 13 months (28%), but it increased to the most prevalent profile from 24 months to kindergarten age (30 to 37%).
3. The *SU/negative parenting* profile was marked by a high probability of exposure to caregiver harshness, and low sensitivity and a moderate probability of exposure to caregiver SU. It was the third most prevalent profile at 13 months (21.32%), but it was the least prevalent profile from 24 months to kindergarten age (16 to 19%).
4. The *SU/low family risks* profile was marked by a high probability of exposure to caregiver SU and a low probability of exposure to caregiver psychological distress, family violence, harshness, or low sensitivity. It was the most prevalent profile at 13 months (30%) but decreased to the second most prevalent profile from 24 months to kindergarten age (24 to 32%).

Latent Profile Membership and Caregiver Substance Use

Figure 1 displays the proportion of children in each family risk profile for the whole sample and prenatal cocaine exposure status at 13, 24, 36, and 48 months, and kindergarten age. The profile distribution differed significantly between children prenatally exposed to cocaine and children in the control group ($\Delta 2ll(3) = 8.56$, $p = 0.034$). The children in the control group were more likely to be members of the *no SU/low family risks* profile (37%) and the *SU/low family risks* profile (29%) and less likely to be in the *SU/negative parenting* profile (13%) than the children who were prenatally exposed to cocaine (21%, 24%, and 29%, respectively).

Table 5 shows the prevalence rates of binge drinking, ≥ 10 cigarettes/day, and cocaine use for each of the three SU latent profiles across time. Whereas the *SU/family risks* profile had the highest rates of smoking (i.e., 10 or more cigarettes a day) at 48 months (38.7% vs. 8% in the *SU/negative parenting* profile and 32% in the *SU/low family risks* profile), the *SU/low family risks* profile had the highest rates at kindergarten age (48.6% vs. 26.5% in the *SU/family risks* group and 20% in the *SU/negative parenting* profile). The *SU/low family risks* profile had the highest rate of binge drinking at 13, 24, 36, and 48 months (see

Table 5). There were no significant differences between the latent profiles with respect to the number of individuals who reported using cocaine.

Adolescent Well-Being as a Function of Profile Membership

We predicted early adolescent well-being (hope, happiness, and life satisfaction) by likelihood of membership in the four family risk profiles (a continuous measure of inclusion probability) at 13, 24, 36, and 48 months and kindergarten age (see Table 6).

Hope—Children who had a higher probability of membership in *SU/family risks* profile at 13, 24, 36, and 48 months and kindergarten age had lower levels of hope in adolescence. No significant relations were found with membership in the other profiles.

Happiness—Lower scores on happiness in adolescence was related to a higher probability of membership in the *SU/low family risks* profile at 13, 24, 36, and 48 months. In addition, children who had a higher probability of membership in the *SU/negative parenting risks* profile at 13, 24, 36, and 48 months had higher levels of happiness in adolescence. No other significant relations were found.

Life Satisfaction—Children with a higher probability of membership in the *SU/family risks* profile at 13 and 48 months, and kindergarten age had lower levels of life satisfaction in adolescence. In addition, higher levels of life satisfaction in adolescence were related to a higher probability of membership in the *SU/low family risks* profile at 13 months. No other significant relations were found.

Transitions Across Infancy and Early Childhood and Between Profiles

Table 7 presents the transition probabilities, given profile membership at the previous time. Regarding stability in profile membership from 13 months to kindergarten age, results indicated that the largest proportion (64.2%) of children stayed in the same profile across the five time points. The *no SU/low family risks* group was the most stable, with 85 to 97% of children being in this profile between time points and 77% staying in this profile across time. Stability was lowest for children in the *SU/negative parenting* group, with 70 to 86% of those children being in this profile between time points and 58% staying in this profile across time.

With regard to transition types, approximately 27.9% of the sample transitioned into another profile once between 13 months and kindergarten age and 7.8% made multiple transitions across time. Of the sample that made a single transition into another profile, there were more children in higher-risk profiles moving into a lower-risk grouping (63.9%) than children transitioning from a lower-risk profile to a higher-risk environment (36.1%). Next, we looked at children who were in the two moderate risk profiles (i.e., *SU/negative parenting and SU/low family risks*) at 13 months but transitioned to either the *no SU/low family risks* profile (i.e., transitioned to a lower risk profile) or the *SU/family risks* profile (i.e., transitioned to a higher risk profile) by kindergarten age. Of those in a moderate risk profile at 13 months (n = 100), 17% transited to the *no SU/low family risks* profile by kindergarten age (4%, 5%, 1%, and 7% at 24, 36, 48 months, and kindergarten age, respectively), while

8% transited to the *SU/family risks* profile (4%, 0%, 2%, and 8% at 24, 36, 48 months, and kindergarten age, respectively).

Adolescent Well-Being as a Function of Profile Transitions

After investigating patterns in transitions between profiles from 13 months to kindergarten age, we next estimated a series of ANOVAs to determine how transitioning between the risk profiles influences adolescent well-being. When significant differences were found, we made pairwise comparisons using a Bonferroni correction to test which profiles were different from one another. Findings from these analyses are discussed below and presented in Table 8.

Stable Profile Membership and Adolescent Well-Being

Hope: Regarding hope, adolescents in the stable *SU/family risks* profile had significantly lower levels of hope than adolescents who were in the three lower-risk stable transition profiles.

Happiness: Adolescents in the stable *SU/negative parenting* profile had significantly higher levels of happiness than adolescents in the other three stable profiles. Adolescents in the stable *no SU/low family risks* stable profile reported significantly more happiness than those in the *SU/low family risks* stable profile.

Life Satisfaction: Adolescents in the stable *SU/family risks* stable profile had significantly lower levels of life satisfaction than those who were in the three lower-risk stable transition profiles.

Transition to Higher-Risks Profile Versus Lower-Risk Profile

Hope: There were no significant differences in levels of hope between adolescents who transitioned to a higher-risk profile and those who transitioned to a lower-risk profile.

Happiness: Adolescents who transitioned to a lower-risk profile had significantly higher levels of happiness than adolescents who transitioned to a higher-risk profile.

Life Satisfaction: Regarding life satisfaction, there were no significant differences between adolescents who transitioned to a higher-risk profile and those who transitioned to a lower-risk profile.

Discussion

The role multiple, co-occurring risk factors play in children's socioemotional adjustment has been of interest to developmental psychologists for decades (Cicchetti, 1993; Sroufe, 1990). However, very little research has examined patterns of change and stability in cumulative risk exposure during early childhood and how patterns of change are related to adolescent well-being (see Wadman et al. (2020) for exception). Using a longitudinal design with a high-risk sample, this study advances prior research on cumulative risk by using LTA to identify four groups of children with varying early risk exposure profiles from

infancy and early childhood: *SU/family risks*, *no SU/low family risk*, *SU/negative parenting*, and *SU/low family risk*. We found that most children stayed in the same profile (64.2%) across time, while the rest transitioned between profiles. We also investigated whether levels of risk exposure (based on class membership) and the way risk profile membership changes over time were associated with hope, happiness, and life satisfaction in adolescence and found that a child exposed to caregiver SU and family adversity had lower positive outcomes in EA. Moreover, stable membership in the *SU/family risks* profile had significant maladaptive consequences on adolescent well-being. Such information is important for tailoring intervention strategies to the unique combinations of caregiver SU and SU-related risk and developmental periods that may promote the best outcomes.

Constellations of Risk Exposure

Overall, the results from this study suggest that it is possible to identify mutually exclusive and meaningful risk profiles based on at-risk children's experiences of SU and SU-related risk factors across infancy and early childhood. In this study, children were categorized based on similar patterns of postnatal caregiver SU, caregiver psychological distress, exposure to violence, harsh parenting, and low sensitivity. We identified four distinct patterns of exposure to caregiver SU and SU-related risks across time. Profile differences were largely driven by exposure to caregiver SU and parenting practices. A third of the children (28–37% across timepoints) were in the *no SU/low family risks* group, and they experienced low risk across domains. Approximately 19–25% of children were in the *SU/family risks* profile, and they experienced high levels of caregiver SU and caregiver distress, and moderate levels of exposure to family violence and negative parenting. The rest of the sample consisted of children who experienced moderate risks: the *SU/low family risks* profile (24–32%) and the *SU/negative parenting* profile (16–21%).

These findings are consistent with prior work using person-centered approaches to model cumulative risk, demonstrating that children's risk exposure experiences are best captured by three to six distinct risk profiles: a low-risk profile, a high-risk profile, and one or more profiles characterized by various combinations of poverty, family dysfunction, and caregiver risk characteristics (Cooper & Lanza, 2014; Copeland et al., 2009; Herbers et al., 2019; Lanza et al., 2010; Parra et al., 2006; Pratt et al., 2016; Rhoades et al., 2011; Roy & Raver, 2014). For example, Herbers et al. (2019) identified five profiles of children exposed to early adversity: a *high-risk low resources/family stress* profile (20.6% of the sample), a *low risk* (23.0%) profile, and three moderate risk profiles including *poverty/single mother risk* (21.0%), *poverty/immigrant mother risk* (12.9%), and *family stress risk* (22.5%). Furthermore, the percentage of children in the different profiles at each assessment resembled estimates from other studies using data from high-risk samples (e.g., Copeland et al., 2009; Herbers et al., 2019). For instance, prevalence rates for the *no SU/low family risks* profile are remarkably consistent with recent work that found 21–29% of at-risk preschool children were exposed to relatively low levels of risk (Copeland et al., 2009; Herbers et al., 2019). Together, these results suggest that exposure to low levels of risk is a fairly common experience even within families considered to be at higher risk. The percentage of children who experienced higher levels of risk across domains (19–25%) is also similar to estimates in prior research on at-risk children (23–37%; Copeland et al., 2009; Herbers et al., 2019).

Regarding the two moderate-risk groups, the prevalence rates for the *SU/low family risks* profile indicate that, while caregiver SU is common in at-risk families, it does not necessarily co-occur with other family-level risks. However, the coupling of caregiver SU and negative parenting (harshness and low sensitivity) in the *SU/family risks* profile and the *SU/negative parenting* profile highlights the need for interventions to consider the potential parenting challenges arising in the context of caregiver SU. Furthermore, although caregiver psychological distress is often associated with harsh parenting and trouble maintaining sensitive parenting strategies (Goodman et al., 2011; Kelley et al., 2015; Murray et al., 2011; Vera et al., 2012), the *SU/negative parenting* profile identified in the current study indicates that caregiver psychological distress should not be presumed to invariably co-occur with suboptimal parenting behaviors.

Patterns of Risks Exposure Across Infancy and Early Childhood

Most children (64.2%) remained in the same profile across time: They tended to experience the same types of risks from infancy to kindergarten age. Specifically, patterns of stability included a *stable no SU/low family risks* group (24.5% of children), a *stable SU/family risks* group (15.2%), a *stable SU/negative parenting* group (8.8%), and a *stable SU/low family risks* group (15.7%). The relative stability of profile membership found in the current study is consistent with stability estimates (55 to 86%) reported in previous studies (Dierkhising et al., 2019; Dunn et al., 2011). These findings highlight the need for prevention and intervention programs to consider and target not only unique constellations of risk experiences but also the notable stability of these adverse experiences across infancy and early childhood.

Regarding transitions, we found that, among children who made a single transition into another profile across time, there were more children in higher-risk profiles moving into a lower-risk grouping (63.9%; e.g., moving from the *SU/family risks* group to the *SU/negative parenting* group, or from the *SU/negative parenting* group to the *no SU/low family risks* group) than children transitioning from a lower-risk profile to a higher-risk environment (36.1%). Moreover, children in the two moderate risk profiles (i.e., *SU/negative parenting and SU/low family risk*) at 13 months were twice as likely to transition into the *no SU/low family risks* profile (17%) than the *SU/family risks* profile (8%) by kindergarten age. The findings indicate that it is possible to identify children who are at risk due to either chronic adverse experiences or increases in adverse experiences over time and who may benefit from prevention and intervention services. Future work that examines factors that drive consistency or transition between risk profiles during early childhood would help in the design of such programs.

Family Risk Profiles and Adolescent Well-Being

There was variation in adolescents' well-being as a function of risk profile membership and profile transitions across time. As expected, membership in the *SU/family risks* profile at any point during infancy and early childhood was negatively related to hope in adolescence. Likewise, life satisfaction was negatively related to the probability of membership in the *SU/family risks* profile at 13 and 48 months and kindergarten age. Moreover, adolescents who were consistently in this high-risk profile across time had significantly lower levels of hope

and life satisfaction than adolescents who were consistently in the three lower risk profiles (i.e., *no SU/low family risks*, *SU/negative parenting*, and *SU/low family risks*). With regard to adolescents' self-reported happiness, children who were in the stable *SU/family risks* group had lower levels of happiness in adolescence than children who were in the stable *SU/negative parenting* group. In addition, adolescents in the stable *SU/low family risks* group reported less happiness than those who were in the stable *no SU/low family risks* group. The former patterns of results are consistent with cumulative risk models such that children exposed to a greater number of risk factors have worse functioning (e.g., Appleyard et al., 2005; Evans et al., 2013), and prior work indicating that persistent exposure to cumulative risk puts children at increased risk for maladjustment (Ackerman et al., 1999; Gutman et al., 2019; Letourneau et al., 2013). However, closer examination of the pattern of results indicates that the cumulative risk account of risks would not have told the whole story.

Indeed, the person-centered approach provided a more nuanced understanding of how different configurations of risk are related to adjustment. Specifically, although, children in the *SU/negative parenting* profile and children in the *SU/family risks* profile would have had similar cumulative risk scores (3 versus 4), membership in these profiles was differently associated with adolescent outcomes. For example, whereas the probability of membership in the *SU/family risks* profile was not related to adolescent reported happiness, membership in the *SU/negative parenting* profile at 13, 24, 36, and 48 months was positively associated with happiness. In addition, the stable *SU/negative parenting* group had higher levels of happiness than both the stable *SU/low family risks* and the stable *no SU/low family risks* groups (with cumulative risk scores of 1 and 0, respectively). This result suggests that, despite being exposed to caregiver SU, harsher parenting, and lower sensitivity in childhood, adolescents in the *SU/negative parenting* profile demonstrated unique strengths. This result is in line with prior work, demonstrating optimal levels of mental health at moderate levels of early-life adversity (Edge et al., 2009; Höltge et al., 2019). Together, these findings support with the steeling effect, which suggests that prior exposure to moderate adversity may strengthen a child by increasing their resilience to later stress (Rutter, 2012). However, more work is needed to understand the processes that foster desirable outcomes among this group of adolescents.

We also found that, for the most part, children in the *no SU/low family risks* profile and those who were consistently in this low-risk profile across time did not exhibit greater well-being than children in the moderate risk groups. This finding is consistent with other works, showing that early membership in high-risk profiles was more predictive of poorer academic and socioemotional functioning outcomes in middle childhood than a lack of risks (Yan et al., 2019). It could be that adverse experiences predict child adjustment in a curvilinear manner such that risk exposure above a critical threshold level (e.g., experiencing high levels of risks across multiple domains and time) has a very large effect on adjustment, but, before reaching this threshold, increases in risk have little effect on adjustment. It is possible that children whose risk experiences do not meet the threshold may be misidentified as resilient simply because they do not develop negative outcomes. Though examining threshold effects is beyond the scope of the current study, it may be an important direction for future studies using a variable-centered approach to examine pathways to adolescent adjustment among high-risk samples. There may also be heterotypical expression of

problems among children in the highest risk group. For instance, Brody et al. (2016) found that, while black adolescents in the most disadvantage families scored high on measures of psychosocial health, they had worse physical health than black adolescents living in more-privileged families. Future studies examining successful adaptation despite risk exposure should consider using person-centered models to separate resilience from lower overall risk. Furthermore, future work should consider using person-centered approaches to understand heterogeneity in outcomes among children exposed to the same constellations of risk factors. For example, although adolescents in the *SU/family risks* profile reported lower levels of well-being, there may be heterogeneity in outcomes, including a group of adolescents with high levels of hope, happiness, and life satisfaction. Findings may guide the design of tailored intervention and prevention programs for children in specific risky environments.

Strengths and Limitations

This study had several notable strengths, including the six-wave longitudinal design, utilizing multiple methods to assess study constructs, and testing changes at the individual level. Despite these strengths, several limitations to the current study merit consideration. First, given that the sample was composed of predominantly lower-income African-American children who are at risk due to prenatal SU, the results may not generalize to lower-risk community samples. However, this understudied group is at risk for maladjustment (Eiden et al., 2015; Min et al., 2014), and, therefore, this study makes an important contribution to the field. Given that prevalence within each profile may differ across samples due to differences in socioeconomic, familial, and demographic risk factors, future research should attempt to replicate these findings with other groups of children. Second, there was approximately an eight-year gap between data collected at kindergarten age and early adolescence, which precluded us from testing change in profile membership during this time as well as the impact of these transitions on adolescent well-being. Nevertheless, prior work indicating that early child appears to be a period of high sensitivity to adversity (Wadman et al., 2020) and that indicators of family adversity are, relatively, stability during this age range (Dunn et al., 2011) increases our confidence in the utility of these findings. Third, measures of well-being were only assessed in adolescence. Controlling for prior levels of hope, happiness, and life satisfaction would strengthen our understanding of the role family risk profiles play in the development of well-being in adolescence. Fourth, missing data analysis indicated there may be some bias due to attrition, and these results should be viewed in the context of this potential bias. Fifth, we were unable to evaluate adolescent well-being for some patterns of transition due to small group numbers. For example, do children exposed to higher environmental instability (e.g., children moving between *SU/family risks* and *no SU/low family risks* multiple times) compared to others who start in the same profile but make a single transition (e.g., from *SU/family risks* to *no SU/low family risks* or from *no SU/low family risks* to *SU/family risks*) experience lower levels of well-being in adolescence? This remains an important area for future study. Finally, the study was limited by its reliance on self-reported well-being in adolescence. Although using self-reports reduced the impact of single-informant bias (i.e., where the caregiver reports on exposure to violence, their own SU and mental health, as well as the adolescents'

well-being), it is possible that there may have been over-reporting of hope, happiness, and life satisfaction due to social desirability bias.

Summary

In conclusion, we found four profiles of varying levels of early exposure to caregiver SU and SU-related family risks, with profile differences largely driven by exposure to caregiver SU (shared by all but the *no SU/low family risks* profile) and parenting practices (relatively high versus low levels of negative parenting behaviors). Moreover, children showed substantial stability in family risk profile membership between 13 months and kindergarten age, with less than a third of the sample moving into a different profile during this period. Our results also highlighted that exposure to both caregiver SU and high levels of family adversity during early childhood and the stability of familial adversity had significant consequences on adolescent well-being, substantiating the importance of understanding early factors that cumulatively affect adolescents. Interventions that target caregiver SU, address specific family risk characteristics associated with SU, and consider the timing of risk exposure might be important for promoting well-being in adolescence among at-risk families.

Data Availability

The data that support the findings of this study are available from the corresponding author, [DS], upon reasonable request.

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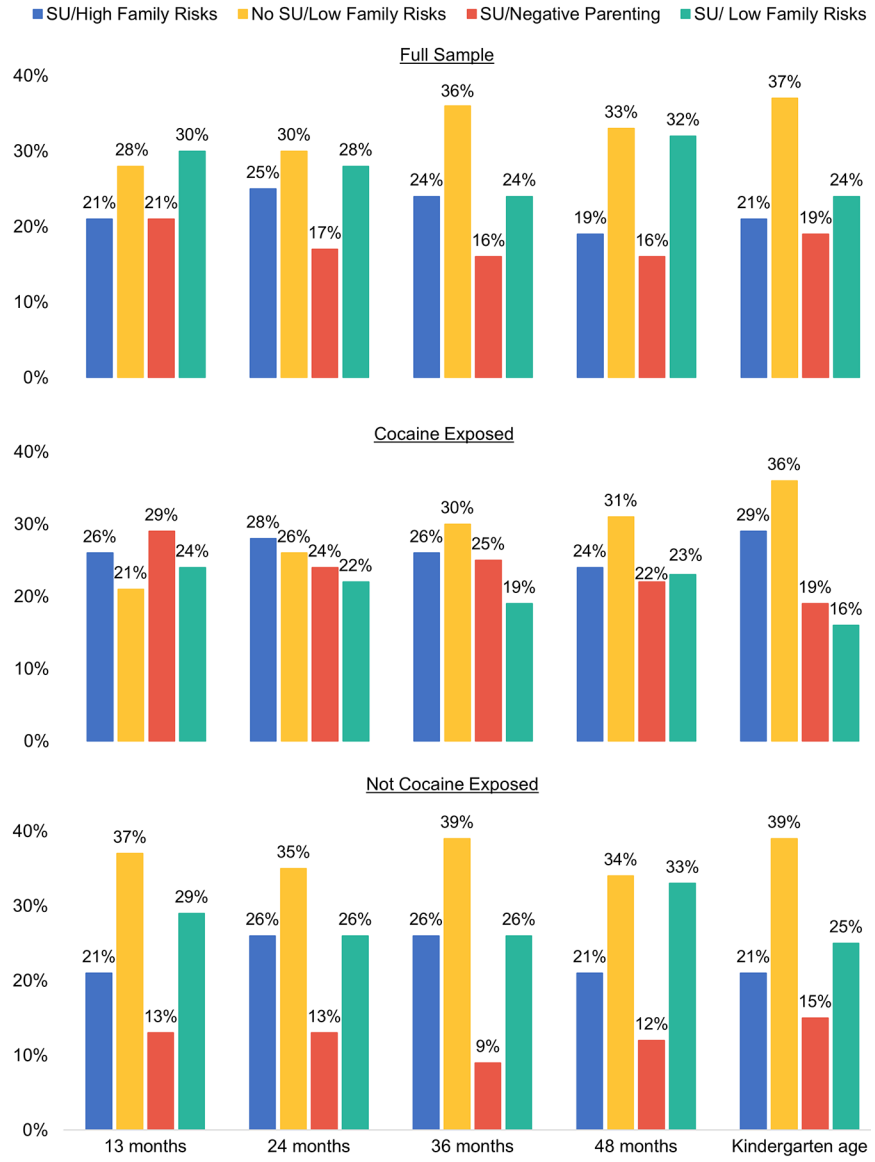

Fig. 1.

Prevalence of latent profiles for full sample and by prenatal cocaine exposure

Table 1

Descriptive statistics for the study variables

	Frequencies				
Indicators of latent profiles:	**13 months**	**24 months**	**36 months**	**48 months**	**Kindergarten age**
Ongoing substance use	88 (47.6%)	68 (39.9%)	69 (42.6%)	72 (44.7%)	65 (38.5%)
Caregiver psychological distress	46 (24.9%)	44 (25.6%)	43 (26.1%)	40 (25.0%)	43 (25.9%)
Family violence	49 (26.6%)	43 (25.5%)	31 (19.1%)	38 (23.6%)	49 (29.0%)
Harshness	55 (33.3%	45 (26.6%)	43 (27.6%)	41 (25.9%)	44 (26.5%)
Low sensitivity	48 (27.2%)	46 (27.2%)	40 (25.6%)	46 (29.1%)	48 (28.9%)
Early adolescence well-being	***n***	**Mean (*SD*)**	***Range***		
Happiness	152	5.41 (1.23)	1–7		
Life satisfaction	158	27.63 (4.84)	14–35		
Hope	159	25.35 (6.24)	10–36		

Table 2

Bivariate correlations among the study variables

Variable	*n*	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.
13 Months																												
1. SU	185	.05	.19*	.11	.07	.57*	.06	.10	.02	.02	.48*	.07	.13	.08	−.01	.38*	.17*	.12	.01	−.03	.45*	.07	.14	.06	.02	−.09	−.07	−.03
2. CP	185		.22*	−.10	.11	.12	.62*	.23*	.02	−.06	.20*	.59*	.12	−.05	−.02	.09	.51*	.20*	.04	−.10	.19*	.48*	.09	.05	−.04	−.02	.04	.07
3. Viol	184			.11	.02	.17*	.29*	.14	.02	.01	.26*	.22*	.32*	.06	.09	.22*	.10	.35*	.15	.07	.12	.16	.16*	−.01	.13	.03	−11	.05
4. HP	165				.40*	.11	−.05	.00	.33*	.13	.09	−.04	.15	.17	.07	.16	−.03	.15	.20*	.22*	.14	.06	.13	.13	.21*	−.04	−.02	−.13
5. Low SP	165					−.01	.10	−.05	.14	.22*	.07	.06	−.06	.11	.19*	−.03	.17*	.01	.16	.19*	.07	.20*	−.05	−.04	.07	.09	.09	−.01
24 Months																												
6. SU	172						.17*	.19*	.02	−.05	.45*	.11	.13	.00	−.09	.39*	.12	.10	−.14	−.04	.39*	.15	.22*	.02	−.02	.09	−.10	.05
7. CP	168							.23*	−.11	−.04	.22*	.76*	.10	.01	.07	.05	.41*	.13	.03	.02	.12	.53*	.19*	.02	.01	.09	.08	.04
8. Viol	172								−.02	−.03	.16	.26*	.11	−.05	−.02	.18*	.09	.14	−.02	−.02	.15	.16	.25*	.10	.07	.09	−.06	.08
9. HP	168									.32*	−.05	−.05	.04	.14	.14	.09	.05	.04	.27*	.02	.13	.04	.09	.05	.06	−.03	−.15	−.14
10. Low SP	168										.06	−.13	−.01	.01	.15	.07	−.03	.03	.08	.16	.18*	−.05	−.12	.08	−.02	−.06	.01	−.03
36 Months																												
11. SU	162											.31*	.31*	.02	−.07	.55*	.22*	.12	−.03	−.06	.63*	.32*	.15	.01	−.10	.01	−.07	.03
12. CP	165												.11	.09	.11	.08	.53*	.10	.05	.06	.21*	.55*	.18*	.01	−.01	.06	.12	.02
13. Viol	160													−.01	−.03	.35*	.13	.28*	−.13	−.03	.15	.17*	.30*	−.07	−.15	.04	.05	−.03
14. HP	156														.33*	−.06	.09	−.08	.27*	.15	.02	.08	.04	.19*	.27*	−.13	−.05	−.07
15. Low SP	156															−.07	.11	.01	.07	.35*	−.04	.09	.00	.21*	.23*	−.12	.05	.02
48 Months																												
16. SU	144																.16*	.21*	.01	.03	.50*	.09	.19*	−.04	−.06	−.04	−.16	−.07
17. CP	146																	.24*	−.04	.02	.21*	.49*	.12	−.02	−.03	−.01	.15	.01
18. Viol	148																		.07	.00	.04	.11	.10	−.05	.10	.07	−.01	−.01
19. HP	143																			.16*	.09	.07	.06	.35*	.29*	−.06	−.06	−.08
20. Low SP	143																				.04	−.01	.05	.06	.24*	.12	.10	.06
Kindergarten Age																												

Advers Resil Sci. Author manuscript; available in PMC 2024 June 01.

Variable	*n*	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.
21. SU	148																					.22*	.14	.05	−.05	.07	−.12	−.02
22. CP	147																						.18*	.03	.04	.04	.03	.02
23. Viol	148																							.12	.15	.04	.05	−.07
24. HP	145																								.52*	−.12	−.13	−.06
25. Low SP	145																									−.16	−.14	−.07
Adolescence																												
26. Hope	159																										.41*	.41*
27. Happiness	152																											.43*
28. LS																												

Concurrent correlations are outlined; *SU*, substance use; *CP*, caregiver psychological distress; *Viol*, family violence; *HP*, harsh parenting; *SP*, sensitive parenting; *LS*, life satisfaction;.

* $p < 0.05$

Table 3

Model fit statistics for latent transition analysis models with two to five latent statuses (n = 216)

Number of profiles	Log-likelihood	G^2	*df*	AIC	BIC
2	−2322.51	2615.66	33,554,372	2733.66	2932.80
3	−2224.95	2420.53	33,554,330	2622.53	2963.43
4	***−2128.71***	***2228.05***	***33,554,280***	***2530.05***	***2950.72***
5	−2083.42	2137.48	33,554,222	2555.48	3260.91

The selected four-status solution is highlighted in bold italics. *df*, degrees of freedom; *AIC*, Akaike information criterion; *BIC*, Bayesian information criterion

Table 4

Item response probabilities of latent profiles for the selected model ($n = 216$)

	Profiles			
	SU/Family Risks	**No SU/Low Family Risks**	**SU/Negative Parenting**	**SU/Low Family Risks**
Indicator of Risk				
Ongoing SU	**.62**	.00	**.43**	**.81**
Psychological Distress	**.93**	.07	.05	.09
Family Violence	**.44**	.13	.18	.23
Harshness	**.41**	.14	**.75**	.14
Low Sensitivity	**.44**	.10	**.75**	.12

Bold indicates the probability > 0.40. Profile defining probabilities are outlined. Item-response probabilities were constrained to be equal across time. *SU,* substance use

Table 5

Prevalence of substance use by profile membership

Profile	**SU/family risks**	**SU/negative parenting**	**SU/low family risks**			
Substance use	***n*(%)**	***n*(%)**	***n*(%)**	**Δ^2**	***df***	***p***
13 months						
Binge drinking	15 (39.5%)	12 (30.8%)	32 (58.2%)	7.53	2	0.023
≥ 10 cigarettes/day	14 (36.8%)	12 (30.8%)	20 (36.4%)	.41	2	0.815
Cocaine use	6 (15.8%)	2 (5.1%)	10 (18.2%)	3.51	2	0.173
24 months						
Binge drinking	12 (29.3%)	5 (17.9%)	25 (50.0%)	9.12	2	0.010
≥ 10 cigarettes/day	12 (29.3%)	7 (25.0%)	17 (34.0%)	.72	2	0.698
Cocaine use	9 (22.0%)	1 (3.6%)	7 (14.0%)	4.60	2	0.100
36 months						
Binge drinking	20 (50.0%)	3 (11.5%)	21 (53.8%)	13.21	2	0.001
≥ 10 cigarettes/day	14 (35.0%)	5 (19.2%)	18 (46.2%)	4.96	2	0.084
Cocaine use	10 (25.0%)	1 (3.8%)	6 (15.4%)	5.23	2	0.073
48 months						
Binge drinking	10 (32.3%)	7 (29.2%)	31 (62.0%)	10.25	2	0.006
≥ 10 cigarettes/day	12 (38.7%)	2 (8.0%)	16 (32.0%)	7.07	2	0.029
Cocaine use	8 (25.8%)	1 (4.0%)	6 (12.0%)	5.78	2	0.056
Kindergarten age						
Binge drinking	18 (52.9%)	8 (26.7%)	18 (51.4%)	5.53	2	0.063
≥ 10 cigarettes/day	9 (26.5%)	6 (20.0%)	17 (48.6%)	6.84	2	0.033
Cocaine use	7 (20.6%)	1 (3.3%)	5 (14.3%)	4.22	2	0.121

SU, substance use; Δ^2, chi-square test statistic; *df*, degrees of freedom

Table 6

Regression models predicting well-being by probability of conditional profile membership ($n = 216$)

Outcome variable	Hope		Happiness		Life satisfaction	
Profile	***β***	**SE**	***β***	**SE**	***β***	**SE**
13 months						
SU/family risks	−0.15*	0.07	−0.04	0.07	−0.15*	0.07
No SU/low family risks	0.13	0.08	−0.03	0.08	0.01	0.08
SU/negative parenting	−0.02	0.08	0.15*	0.08	0.02	0.08
SU/low family risks	0.06	0.08	−0.17*	0.07	0.14*	0.07
24 months						
SU/family risks	−0.16*	0.07	−0.03	0.08	−0.12	0.07
No SU/low family risks	0.11	0.08	−0.02	0.08	−0.02	0.08
SU/negative parenting	0.04	0.08	0.18*	0.08	0.07	0.08
SU/low family risks	−0.02	0.08	−0.20*	0.07	0.10	0.07
36 months						
SU/family risks	−0.18*	0.07	−0.01	0.08	−0.12	0.07
No SU/low family risks	0.12	0.08	−0.05	0.08	0.02	0.08
SU/negative parenting	0.07	0.08	0.16*	0.07	0.11	0.07
SU/low family risks	−0.05	0.08	−0.21*	0.07	0.01	0.08
48 months						
SU/family risks	−0.15*	0.07	−0.04	0.07	−0.18*	0.07
No SU/low family risks	0.08	0.08	−0.03	0.08	0.07	0.08
SU/negative parenting	0.11	0.08	0.17*	0.08	0.09	0.08
SU/low family risks	−0.05	0.08	−0.15*	0.07	−0.03	0.08
Kindergarten age						
SU/family risks	−0.17*	0.07	−0.04	0.08	−0.16*	0.07
No SU/low family risks	0.07	0.07	−0.02	0.08	0.05	0.08
SU/negative parenting	0.04	0.08	0.10	0.08	0.08	0.07
SU/low family risks	0.03	0.07	−0.08	0.07	−0.04	0.07

* $p < 0.05$

Table 7

Transition probabilities across time

	Latent profile at 24 months (*n* = 216)			
Latent profile at 13 months (*n* = 216)	**SU/family risks (25%)**	**No SU/low family risks (30%)**	**SU/negative parenting (17%)**	**SU/low family risks (28%)**
SU/family risks (20.6%)	**1.00**	0.00	0.00	0.00
No SU/low family risks (28%)	0.05	**0.95**	0.00	0.00
SU/negative parenting (21.32%)	0.00	0.15	**0.76**	0.09
SU/low family risks (30%)	0.10	0.01	0.02	**0.86**
	Latent profile at 36 months (*n* = 216)			
Latent profile at 24 months (*n* = 216)	**SU/family risks (24%)**	**No SU/low family risks (36%)**	**SU/negative parenting (16%)**	**SU/low family risks (24%)**
SU/family risks (25%)	**0.93**	0.07	0.00	0.00
No SU/low family risks (30%)	0.03	**0.97**	0.00	0.00
SU/negative parenting (17%)	0.00	0.06	**0.79**	0.15
SU/low family risks (28%)	0.00	0.11	0.10	**0.79**
	Latent profile at 48 months (*n* = 216)			
Latent profile at 36 months (*n*=216)	**SU/family risks (19%)**	**No SU/low family risks (33%)**	**SU/negative parenting (16%)**	**SU/low family risks (32%)**
SU/family risks (24%)	**0.69**	0.08	0.11	0.12
No SU/low family risks (36%)	0.01	**0.85**	0.07	0.07
SU/negative parenting (16%)	0.09	0.08	**0.70**	0.13
SU/low family risks (24%)	0.01	0.00	0.00	**0.99**
	Latent profile at kindergarten age (*n* = 216)			
Latent profile at 48 months (*n*=216)	**SU/family risks (21%)**	**No SU/low family risks (37%)**	**SU/negative parenting (19%)**	**SU/low family risks (24%)**
SU/family risks (19%)	**0.95**	0.00	0.06	0.00
No SU/low family risks (33%)	0.03	**0.94**	0.03	0.00
SU/negative parenting (16%)	0.07	0.00	**0.86**	0.08
SU/low family risks (32%)	0.04	0.16	0.08	**0.72**

Stability coefficients are sin bold. Item-response probabilities constrained to be across time

Table 8

Comparison of adolescent's well-being as a function of profile transitions

	Outcomes in adolescences					
	Hope		Happiness		Life satisfaction	
Profile	***n***	***M* (*SD*)**	***n***	***M* (*SD*)**	***n***	***M* (*SD*)**
Entire sample		25.35 (6.24)		5.41 (1.23)		27.63 (4.84)
Stable risk profiles						
1. Stable SU/family risks	31	22.69 (5.60)^{2,3,4}	31	5.21 (1.42)^{3}	31	25.32 (6.15)^{2,3,4}
2. Stable No SU/low family risks	50	26.60 (6.70)^{1}	50	5.38 (1.35)^{3,4}	50	27.92 (5.17)^{1}
3. Stable SU/negative parenting	18	25.46 (7.30)^{1}	18	5.89 (1.47)^{1,2,4}	18	28.68 (5.50)^{1}
4. Stable SU/low family risks	32	25.48 (6.87)^{1}	32	4.89 (1.46)^{2,3}	32	27.62 (5.67)^{1}
F test of differences among groups		$F(3, 127) = 15.53$*		$F(3, 127) = 11.15$*		$F(3, 127) = 11.12$*
Higher-risk versus lower-risk						
5. Lower-risk	39	25.32 (6.46)	39	5.56 (1.23)^{6}	39	28.13 (5.09)
6. Higher-risk	22	25.50 (7.75)	22	5.01 (1.35)^{5}	22	27.66 (5.16)
F test of differences among groups		$F(1, 59) = 0.06$		$F(1, 59) = 14.90$*		$F(1, 59) = 0.71$

Numeric superscripts within each row indicate which classes of risks significantly differed from one another at $p < 0.05$