

Maternal Childhood Maltreatment, Internal Working Models, and Perinatal Substance Use: Is There a Role for Hyperkatifeia? A Systematic Review

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ABSTRACT: The parent-infant relationship is critical for socioemotional development and is adversely impacted by perinatal substance use. This systematic review posits that the mechanisms underlying these risks to mother-infant relationships center on 3 primary processes: (1) mothers' childhood maltreatment experiences; (2) attachment styles and consequent internal working models of interpersonal relationships; and (3) perinatal substance use. Further, the review considers the role of hyperkatifeia, or hypersensitivity to negative affect which occurs when people with substance use disorders are not using substances, and which drives the negative reinforcement in addiction. The authors performed a systematic review of articles (published 2000-2022) related to these constructs and their impact on mother-infant relationships and offspring outcomes, including original clinical research articles addressing relationships between these constructs, and excluding case studies, reviews, non-human animal studies, intervention studies, studies with fewer than 30% female-sex participants, clinical guidelines, studies limited to obstetric outcomes, mechanistic/biological studies, and studies with methodological issues precluding interpretation. Overall 1844 articles were screened, 377 were selected for full text review, and data were extracted from 157 articles. Results revealed strong relationships between mothers' childhood maltreatment experiences, less optimal internal working models, and increased risk for perinatal substance use, and importantly, all of these predictors interacted with hyperkatifeia and exerted a marked impact on mother-infant relationships with less data available on offspring outcomes. These data strongly support the need for future studies addressing the additive impact of maternal childhood maltreatment experiences, suboptimal internal working models, and perinatal substance use, with hyperkatifeia as a potential moderator, and their interacting effects on mother-infant socioemotional outcomes.

KEYWORDS: Childhood maltreatment, substance use, addiction, perinatal, hyperkatifeia, negative affect, attachment, emotional dysregulation

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Introduction

The parent-infant relationship is critical because it relates directly to the future well-being of the child.¹ However, this relationship is highly vulnerable. In particular, maternal mental illness and substance use significantly increase risks to the integrity of this relationship.²⁻⁴ This systematic review posits that the mechanisms underlying this risk center on 3 primary processes: (1) mothers' childhood maltreatment experiences; (2) attachment styles and consequent internal working models of interpersonal relationships; and (3) perinatal substance use. When people experience maltreatment during childhood, including exposure to abuse, neglect or witnessed violence,⁵ they are at higher risk for future use of substances early, often, and problematically.⁶⁻¹⁰ Further, childhood maltreatment

experiences, particularly at the hands of a caregiver, jeopardize the development of healthy relationships,¹¹ impacting internal working models, the templates which influence relationship formation across development.^{12,13} As maltreatment-exposed offspring enter adolescence and young adulthood, formation of partner relationships is influenced by suboptimal internal working models, increasing risk for exposure to intimate partner violence.¹⁴⁻¹⁶ Additionally, the onset of substance misuse during adolescence interferes with development of adaptive coping strategies for regulating emotions and with formation of healthy interpersonal relationships, including parent-offspring relationships.¹⁷⁻¹⁹ During the perinatal period, the tri-partite risks of maternal substance use, maternal childhood maltreatment experiences, and mothers' associated



internal working models of relationships converge, adding to common perinatal risks for mood disturbances and dysregulation associated with hormonal changes, increased stress, and poor sleep.²⁰⁻²³

While pregnant people may consider reducing use of substances during the perinatal period,^{24,25} strong stigma hampers access to treatment including concerns of being reported to child protective services, and this stigma is worse in people of color and those experiencing lower socioeconomic status.²⁶⁻³¹ Further, the importance of these research questions is paramount given the closing of the gender gap in substance use, lower access to treatment in women, racial, ethnic, and socioeconomic disparities,^{32,33} lack of funding for substance use treatment, and the consequent (due to underfunding) lack of high-quality integrated programs for mothers and their infants despite encouraging clinical trial results of such interventions.³⁴⁻³⁸ To summarize, in perinatal people with more severe maltreatment experiences and early substance use initiation, these stunted socioemotional growth trajectories lead to increased risks for two generations (parent and offspring), negatively impacting parental, dyadic, and infant socioemotional development.

When considering mothers with early life trauma and emotional dysregulation who are attempting to curtail substance use during the perinatal period, the concept of hyperkatifeia may be instructive. Hyperkatifeia is defined as greater negative affect and emotional dysregulation in the setting of withdrawal from substances and associated negative reinforcement, driving continued use to escape from negative affective tone.³⁹ A growing body of research highlights the key role of hyperkatifeia and negative reinforcement in the cycle of addiction, suggesting that addiction is a disorder not only of reward deficit but also of stress surfeit⁴⁰⁻⁴³; thus, exposure to childhood maltreatment is not surprisingly noted as a risk factor for this phenomenon.³⁹ Specifically, more severe childhood maltreatment has been associated with early development of chronic negative affect and emotional dysregulation, increased risk of early-onset of substance use, and greater risk for hyperkatifeia.^{39,44-46} Even without substance use, severe exposure to childhood maltreatment has been associated with chronic negative affect and emotional dysregulation.^{44,45,47,48} Further, substance use has worsened during the COVID-19 pandemic, with increasing number of overdoses, poorer access to care, and escalating morbidity and mortality, including in perinatal people.⁴⁹⁻⁵² More generally, the perinatal period is a stressful time and supportive interpersonal relationships are critical for new parents, putting parents who lack these supports and who use substances at greater risk for hyperkatifeia.⁵³⁻⁵⁷ Thus, understanding the specific impact of hyperkatifeia in mothers whose emotional dysregulation and tonic negative affect pre-dated their substance use is critical for two reasons: (1) it can provide a window into the way that negative reinforcement, reward deficit, and stress surfeit processes act on the maternal brain; and (2) in understanding these reward deficits, we may determine how the

presence of “natural rewards” like one’s infant or an increased sense of parenting competency can motivate the path to recovery and enhance engagement in substance use treatment.

This manuscript presents data from a systematic review of hyperkatifeia and its relationship with 3 constructs (1) mothers’ childhood maltreatment experiences; (2) attachment styles and consequent internal working models of interpersonal relationships; and (3) perinatal substance use. Hyperkatifeia is operationalized according to previously published search criteria⁵⁸ (Figure 2). The goal of this review is to understand how this triad of risks impacts mothers, infants, and mother-infant dyads during the perinatal period. Additionally, this review employs a developmental approach, considering the impact of early adversity across adolescence into the mid-adult lifespan, along with tandem risks of substance use and less adaptive internal working models. The conceptual model (Figure 1) outlines the relationships between mothers’ early maltreatment experiences and their impact on relationship formation, as well as how maltreatment history and relational difficulties both predispose people to perinatal substance use. In turn, the model outlines how these constructs impact mother-infant relationships and offspring development, both via direct pathways, as well as indirectly via interactions of these 3 constructs with hyperkatifeia as a potential moderator of their effects.

Methods

A detailed and systematic approach was utilized to search PubMed and PsycInfo databases for all articles published between January 2000 and October 2022 relevant to the 3 constructs (parental perinatal substance use, maternal childhood maltreatment experiences, and attachment/early life relationships) in tandem with one another and with hyperkatifeia (as defined by the search terms in Figure 2 below).

[(perinatal substance use OR childhood maltreatment experiences OR attachment) + hyperkatifeia] OR (perinatal substance use + childhood maltreatment experiences) OR (childhood maltreatment experiences + attachment) OR (perinatal substance use + attachment)

Literature search criteria

Inclusion Criteria: articles published between January 2000 and October 2022 related to the intersection between the construct of hyperkatifeia and at least 2 of the following 3 constructs: (1) mothers’ childhood maltreatment experiences; (2) attachment styles and consequent internal working models of relationships; (3) perinatal substance use.

Exclusion Criteria: case studies; review papers; randomized controlled trials or other intervention studies; significant problems with study quality/methodology (eg, studies with N < 10 participants/cell or which use complex mediational models in cross-sectional studies); case reports; practice parameters; clinical guidelines; studies focused solely on biological males or with <30% of research population of biological female

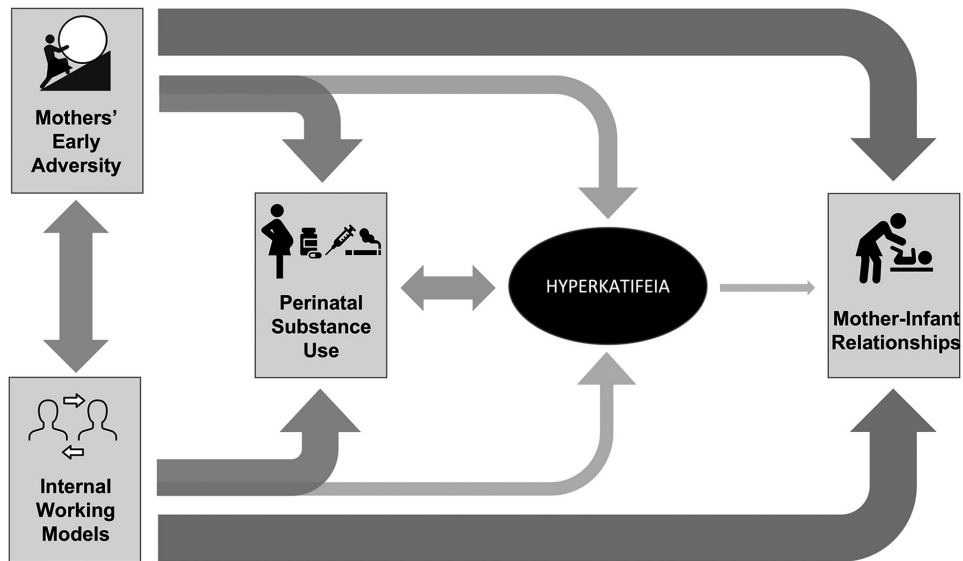


Figure 1. Conceptual model graphic.

Literature Search Strategy

We include detailed search terms and our rationale below. We uploaded all citations ($N=1,844$) into Covidence review software (Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia) and removed duplicates, yielding 1,774 unique articles for title/abstract screening.

Parental perinatal Substance Use: ("parental" OR "maternal" OR "prenatal" OR "postpartum" OR "perinatal" OR "postnatal" OR "peripartum" OR "pregnancy" OR "mother" OR "parent") AND (((alcoholic OR alcoholism OR "alcohol use disorder" OR "alcohol") OR (meth OR methamphetamine OR cocaine OR stimulant OR speed OR crack OR amphetamine)) OR ((opioid OR heroin OR oxycodone OR oxycontin OR fentanyl OR hydrocodone OR hydromorphone) NOT ("neonatal abstinence"))) OR ("cannabis" OR "marijuana" OR "THC" OR "CBD" OR "tetrahydrocannabinol" OR "cannabidiol" OR "cannabinoid" OR "endocannabinoid")) AND ("use" OR "disorder" OR "abuse" OR "dependence" OR "addiction" OR "addict" OR "misuse"))

Childhood Maltreatment Experiences: "maternal childhood maltreatment" OR "maternal early adversity" OR "maternal early exposure" OR "maternal early childhood" OR "maternal early life" OR "maternal adverse childhood" OR "maternal adversity" OR "maternal ace scores" OR "maternal aces" OR "maternal trauma" OR "maternal childhood trauma" OR "interpersonal violence" OR "ipv" OR "domestic violence"

Attachment: "attachment theory"[All Fields] OR "mother infant relationship"[All Fields] OR "mother infant interaction"[All Fields] OR "maternal behavior"[All Fields] OR "biobehavioral synchrony"[All Fields] OR "synchrony"[All Fields] OR "attachment"

Hyperkatifeia: (operationalized according to search terms published in [1]) (withdrawal OR abstinence OR (relapse AND dependence)) AND (amotivation OR anhedonia OR anhedonic OR anxiety OR anxiolytic OR depression OR depressive OR dysphoric OR dysphoria OR irritable OR irritability OR "negative affect" OR "negative affective" OR **"affective lability"** OR **"alexithymia"** OR **"alexithymic"** OR **"emotional lability"** OR "negative emotional" OR "negative emotion" OR "negative reinforcement" OR (pain OR hyperalgesic OR hyperalgesia) OR "stress response" OR "stress reactivity" OR suicide OR suicidal OR unease OR "reward sensitivity" OR "reward deficit" OR "emotional regulation" OR "emotional dysregulation" OR "sleep disruption" OR "sleep disturbance" OR "sleep dysregulation")

****bolded terms added to published hyperkatifeia search criteria by AKO**

Figure 2. Literature search criteria.

sex; toxicological studies; qualitative studies without post-analysis; pharmacological studies (treatment); biological effects of prenatal substance exposure; limited to obstetric outcomes; limited to perinatal mental health; limited to school age/latency; solely addressing factors influencing intimate partner perpetration; mechanistic studies (ie,—neuroimaging, physiology); and non-human animal studies.

Rationale for Inclusion/Exclusion Criteria: Due to this review's focus on postnatal implications of substance use, articles solely focusing on prenatal exposure were excluded, of course while acknowledging here the impact of prenatal exposure. Due to the focus on pregnancy and the postpartum period, studies with <30% females were excluded. The extant literature on parents and children has primarily focused on *cis*-gender

	# of Articles
Parental Perinatal Substance Use + Attachment	563
Parental Perinatal Substance Use + Childhood Maltreatment Experiences	455
Childhood Maltreatment Experiences + Attachment	339
Parental Perinatal Substance Use + Hyperkatifeia	261
Attachment + Hyperkatifeia	188
Childhood Maltreatment Experiences + Hyperkatifeia	38

Figure 3. Literature search results by topic.

heterosexual females and thus the review focuses on this population, while acknowledging the importance of research across parental populations. Studies solely focused on domestic violence perpetration without considering victimization were excluded, as they were outside the scope of this review regarding biological females, given sex and gender patterns in perpetration. Studies solely focused on children of school-age/latency were excluded due to not falling within the intergenerational focus (ie,—early life and adolescent/adult parenthood). To be more specific with respect to this exclusion criterion, we included studies of adolescents which were relevant to them becoming parents or partnered, and we included studies of young children (infancy-toddlers) which were relevant to the relationship between maternal childhood maltreatment experiences, perinatal substance use, mother-infant relationships, and offspring outcomes. The authors added relevant terms to the published hyperkatifeia search language (italicized/bolded in search terms)⁵⁸ (see Figure 2), to capture affective lability. Non-human animal and biological mechanistic studies were excluded as they were outside the scope of this review and would merit a separate review.

Review process

For reference, number of articles by topic in the original search (N=1844) are reported below (Figure 3). The search yielded 1844 articles, 70 of which were duplicates, leaving 1774 articles for initial screening of titles and abstracts (AKO). Next, 1397 articles did not meet inclusion/exclusion criteria. Subsequently, 377 articles underwent full text screening (AKO), with 220 excluded, and data extracted from 157 articles (see Figure 4). Next, a panel of reviewers (IC, DA, HC, BB, KK, LS, AKO) who were trained by Dr. Olsavsky on the Covidence software (Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia. Available at www.covidence.org) extracted data from the articles using a data extraction template in which reviewers reported data from the article, coverage of various themes (whether substance use, childhood maltreatment experiences, race/ethnicity, sex as a biological variable were addressed in the articles), as well as identifying quality issues with data collection, analyses, or interpretation. Each extraction was performed by one reviewer and checked by a second, with either Dr. Olsavsky serving as the final or initial reviewer on each article.

Results

Overall results are first described utilizing a developmental framework. Next, interactions between each of the primary 3 predictors in the conceptual model are reported (Figure 1): (1) mothers' childhood maltreatment experiences; (2) attachment styles and consequent internal working models of interpersonal relationships; and (3) perinatal substance use. In the sections addressing interactions of perinatal substance use and childhood maltreatment experiences with internal working models, impact on mother-infant relationships and offspring outcomes (as well as on partner relationships) is discussed. Subsequently, relationships of these constructs with hyperkatifeia will be discussed, with respect to hyperkatifeia's role as a potential moderator of the effects of these 3 primary constructs.

Overall summary and placing findings within developmental framework

With respect to geography, of the 157 studies included, 63% were performed in the United States, 4% were performed across multiple countries, 6% in Canada, 5% in Australia, 5% in the United Kingdom, 3% in South Africa, 3% in Brazil, 3% in South Africa, 2% in Switzerland, 2% in New Zealand, 1% in Mexico, and the remainder split across various European countries. With respect to developmental stage, of the 157 articles included (Please reference Table 1 for summaries of all articles), 83 addressed the perinatal period, 38 addressed infancy, 28 addressed toddlers/young children, 42 addressed adolescence, and 133 reported data on adults of reproductive age. Of the studies included, 111 (71%) studies reported on substance use, 10 (5%) excluded participants based on substance use, and 37 (24%) neither reported on substance use nor noted it as an exclusion criterion. Reporting patterns for substance use overall were similar to those for perinatal studies, with 59 (71%) reporting on substance use, 6 (7%) excluding based on substance use, and 18 (22%) neither reporting on substance use nor listing it as an exclusion criterion. Substance use data quality varied widely, with some studies collecting self-report scales, timeline followback, or urine toxicological data, while others assessed with one yes/no question regarding amount or any use (ie,—as in large epidemiological studies), or divided groups based on substance use disorders or enrollment in treatment programs (+/- use patterns).

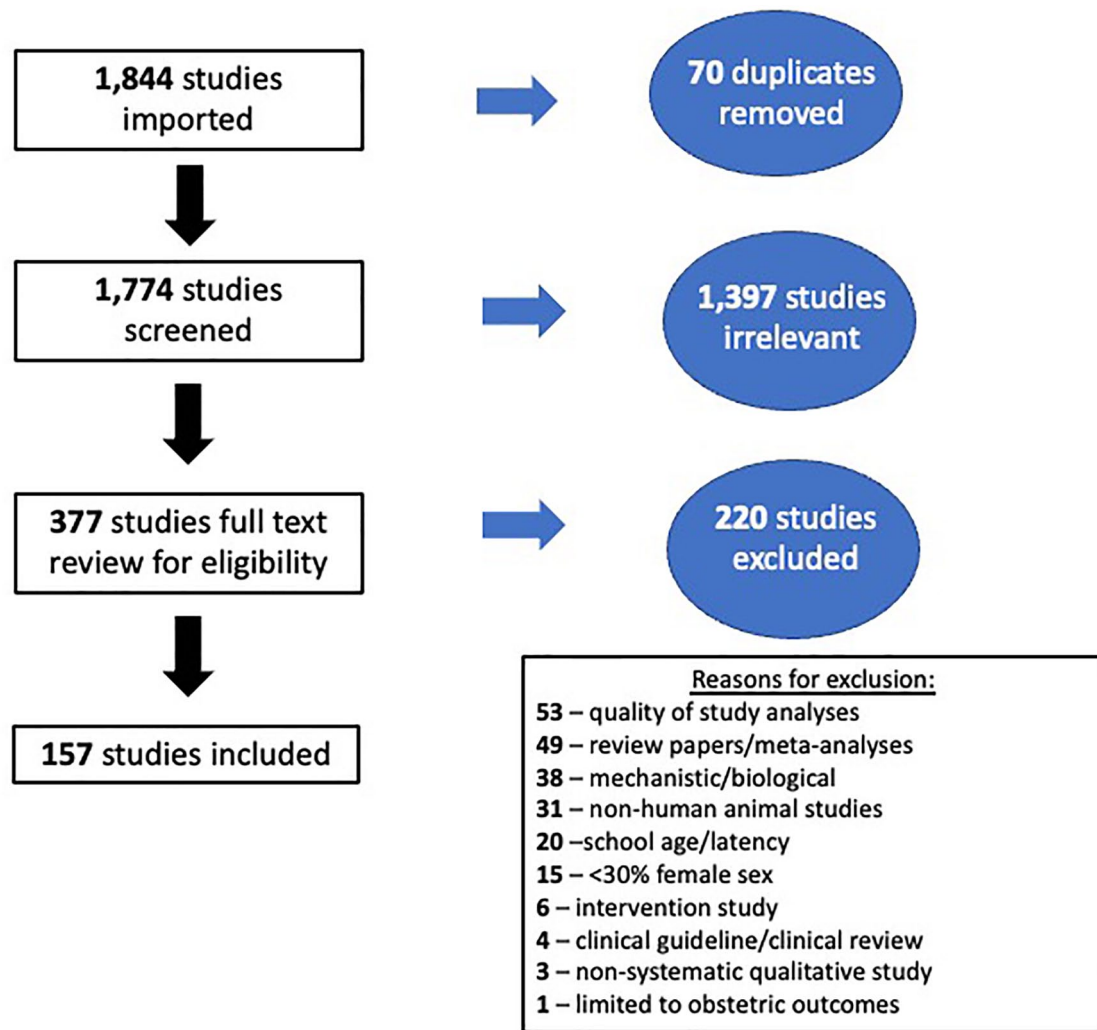


Figure 4. PRISMA flow diagram.

Perinatal substance use and childhood maltreatment experiences

Of the included articles, 40 addressed exposure to childhood maltreatment experiences and their relationship with substance use in people of reproductive age, including adolescence through adulthood.^{6,8,9,33,59-94} With respect to the 15 articles addressing the perinatal period,^{65-77,94} 11 articles supported associations between maternal childhood maltreatment experiences and higher risk for perinatal substance use or cravings for substances.⁶⁵⁻⁷⁵ Of the 17 studies focused on adolescents,^{6,9,65,67,72,78-87,94,95} 13 supported a relationship between childhood maltreatment experiences and increased risk for substance use in adolescence and transitional age youth.^{6,9,78-87,95} Of 14 studies specifically in young adults of reproductive age (which did not relate to adolescent or perinatal periods), all of these studies supported a relationship between childhood maltreatment experiences and substance use.^{8,33,59-64,88-93} The impact of each of these two domains on mother-infant relationships and offspring outcomes is addressed in the sections including interactions with internal

working models, as these effects are likely mediated via this mechanism.

Childhood maltreatment experiences and impaired internal working models

The relationship between impaired internal working models with childhood maltreatment manifests across the female reproductive lifespan in 2 major ways: (1) relationships with partners; (2) relationships with offspring.

Childhood maltreatment experiences and impaired internal working models: Relationships with partners. Of the 26 papers addressing the relationship between childhood maltreatment experiences and risk for difficulties with partner relationships, 24 supported a relationship between exposure to childhood maltreatment and increased risk for intimate partner violence victimization^{14-16,61-64,67,78,80,81,83,89,91,93,96-106} and early sexual initiation,⁹⁴ including 6 supporting these increased risks during the perinatal period,^{67,94,97,98,105,106} 8 in adolescents

Table 1. Summary of Relevant Articles.

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Abdul-Khabir 2014	Cross sectional study	Impact of current and past intimate partner violence on maternal mental health and behaviour at 2 years after childbirth: evidence from the Pacific Islands Families Study	828	New Zealand	Adult Pacific Islander women 2 years postpartum	Yes	Mothers with intimate partner violence were at higher risk for alcohol use, though didn't survive inclusion of confounding variables in model.
Adhia 2019	Cross sectional study	Impact of domestic violence and drug abuse in pregnancy on maternal attachment and infant temperament in teenage mothers in the setting of best clinical practice	150	Australia	Pregnant adolescents	Yes	Exposure to domestic violence during childhood in mothers associated with higher risk for "difficult" infant temperament, as was drug use during pregnancy. Substance use during pregnancy associated with lower self-reported maternal attachment.
Adjei 2022	Prevalence/ incidence of risk factors	Facets of Male Violence Against Women With Substance Abuse Problems: Women With a Residence and Homeless Women	79	Sweden	Women with a residence and homeless women	Yes	Women experiencing homelessness were at higher risk for intimate partner violence, had higher rates of witnessed domestic violence and parental substance use during childhood, and were more likely to experience violence from a male friend/acquaintance. They were also more likely to use substances and less likely to be offered treatment vs. women not experiencing homelessness.
Agrawal 2019	Longitudinal cohort study	Impact of poverty and family adversity on adolescent health: a multi-trajectory analysis using the UK Millennium Cohort Study	11 564	UK	Adolescents	Yes	Children exposed to domestic violence had higher risk for adolescent substance use.
Ahmadabadi 2019	Longitudinal cohort study	A mother's bond: An ecological momentary assessment study of posttraumatic stress disorder symptoms and substance craving during pregnancy	32	United States	Pregnant women with SUD and prior trauma exposure	Yes	Among pregnant women, substance craving was associated with higher levels of PTSD symptoms, and lower levels of self-reported attachment to infants.
AlexMason 2017	Cross sectional study	Individual differences among undergraduate women in methods of coping with stressful events: the impact of cumulative childhood stressors and abuse	828	United States	Undergraduate females	Not reported	College students with higher ACEs utilized more disengaged coping strategies to deal with current stressors.
Bailey 2007	Longitudinal cohort study	Influence of mother-daughter attachment on substance use: a longitudinal study of a Latina community-based sample	133	United States	Adult Latina females and their mothers	Yes	Adolescents with more optimal self-reported attachment to their mother less likely to engage in heavy substance use. Further, being born outside the US associated with decreased risk for heavy alcohol or drug use.

(Continued)

Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Barnett 2021	Longitudinal cohort study	Early adolescent sexual initiation as a problem behavior: a comparative study of five nations	5624	Finland, Scotland, France, Poland, and the United States	Adolescents	Yes	Substance use within both male and female adolescents was associated with higher risk of early sexual initiation. In US girls only, positive parental communication was associated with lower risk for early sexual initiation.
Bazargan-Hejazi 2014	Cross sectional study	Intent to become pregnant as a predictor of exposures during pregnancy: is there a relation?	2905	United States	Pregnant women	Yes	Women w/unintended pregnancy more likely to have exposures including alcohol and drugs prenatally
Beauchamp 2020	Longitudinal cohort study	Intergenerational Effects of Maternal Childhood Experiences on Maternal Parenting and Infant Developmental Progress	295	United States	Mother-infant dyads	Not reported	Relationship between mothers' self-report their own relationship with their parents but not with ACEs in a longitudinal sample of mothers w/low income
Beebe 2020	Longitudinal cohort study	Intergenerational transmission of aggression in romantic relationships: the moderating role of attachment security	75	United States	Adolescents	Not reported	Adolescents exposed to aggression in the home more likely to be in experience intimate partner violence in romantic relationships.
Beeney 2019	Longitudinal cohort study	Intergenerational transmission of attachment for infants raised in a prison nursery	30	United States	Mother-infant dyads (mother incarcerated, infants in prison nursery)	Not reported	Mothers experiencing incarceration (substance use not assessed), mothers' adult attachment styles were: 10% dismissing, 33% secure, 13% preoccupied, and 43% unresolved. Attachment styles of infants residing in prison nursery were 10% avoidant, 13% resistant, 60% secure, and 17% disorganized.
Beijer 2018	Longitudinal cohort study	Effect of maternal adverse childhood experiences (ACE) and cannabis use on pregnancy outcomes	256	United States	Pregnant adults	Yes	People continuing to use cannabis throughout pregnancy had higher rates of lower maternal weight gain, fewer prenatal visits, and higher ACEs scores.
Bernard 2022	Longitudinal cohort study	Interparental violence and childhood adjustment: how and why maternal sensitivity is a protective factor	201	United States	Mother-toddler dyads	Not reported	Witnessing parental violence was associated with higher rates of intimate partner violence exposure during adulthood. Individuals are 2x likely to report depressive symptoms, 3x as likely to use cocaine, and 2x as likely to report having alcohol use disorder during adulthood, as well as being younger at initiation of alcohol use. Witnessing domestic violence during childhood associated with higher risk for experiencing intimate partner violence, adjusting for sex, age, education and SES, regardless of whether person suffered direct violence. Association survived adjustment for depressive symptoms, as well as for cocaine and alcohol use.

(Continued)

Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Boden 2021	Prevalence/incidence of risk factors	Cross-national evidence for the clustering and psychosocial correlates of adolescent risk behaviours in 27 countries	56 090	Multiple countries	Adolescents	Yes	Among adolescents, health risk behaviors of past month cannabis use/drunkenness/daily smoking/ever sexual activity by the age of 15 clustered together on one factor in a confirmatory factor analysis. This clustered risk associated with increased time spent with peers, and lower school attachment and less parent-adolescent positive communication.
Bonache 2019	Cross sectional study	Early Sexual Debut and Associated Factors among In-school Adolescents in Six Caribbean Countries	9948	Antigua and Barbuda, Dominica, Grenada, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago	Adolescents	Yes	Among adolescents, early sexual debut (prior to 15yo) was associated with higher rates of substance use and lower attachment to parents.
Bouvette-Turcot 2020	Longitudinal cohort study	Association of clinical characteristics and cessation of tobacco, alcohol, and illicit drug use during pregnancy	448	United States	Birth mothers	Yes	Women who discontinued or reduced substance use during pregnancy exhibited lower anxiety and depressive symptoms and higher self esteem. Women were most likely to discontinue illicit substances during pregnancy, followed by alcohol and then tobacco.
Bowen 2015	Cross sectional study	Factors associated with physical aggression in pregnant women and adverse outcomes for the newborn	8961	Brazil	Postpartum people	Yes	Women exposed to intimate partner violence has higher rates of alcohol or illicit substance use during pregnancy.
Briggs-Gowan 2019	Prevalence/incidence of risk factors	Intimate Partner Violence Among Pregnant Veterans: Prevalence, Associated Mental Health Conditions, and Health Care Utilization	442	United States	Pregnant veterans	Yes	In a sample of pregnant women, past-year intimate partner violence associated with increased health risk behaviors (including substance use), history of mental health diagnoses, PTSD during pregnancy, history of military sexual trauma.
Brittain 2021	Cross sectional study	Distorted maternal mental representations and atypical behavior in a clinical sample of violence-exposed mothers and their toddlers	41	United States	Mother-infant dyads	Exclusion	Mothers with unbalanced attachment representations of their infant exhibited more intrusive parenting behaviors.
Brook 2001	Qualitative research	Intimate partner violence and reproductive health among methamphetamine-using women in Los Angeles: a qualitative pilot study	30	United States	Women seeking treatment for methamphetamine use	Yes	Rate of intimate partner violence exposure were ~60% in the population studied, with one-sixth of women reporting that they were able to stop methamphetamine use during pregnancy.

(Continued)

Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Brook 2012	Prevalence/incidence of risk factors	Intimate partner violence during pregnancy: incidence and associated health behaviors in a rural population	104	United States	Southern Appalachian women	Yes	Intimate partner violence associated with increased perinatal substance use.
Busch 2010	Longitudinal cohort study	Intimate partner violence in emerging adulthood and subsequent substance use disorders: findings from a longitudinal study	1353	Australia	Adults followed since infancy	Yes	Females at 21 years old who experienced intimate partner violence were at greater risk for alcohol, substance, or nicotine use disorders at 30 years old, even while including prior substance use disorders in the model. Childhood sexual abuse was risk factor for intimate partner violence at 21 years of age.
Byrne 2010	Cross sectional study	Intimate partner violence, prenatal stress, and substance use among pregnant Black women	203	United States	Black pregnant adults	Yes	Greater exposure to intimate partner violence associated w/higher levels of marijuana use and perceived stress with indirect effect of IPV on marijuana use via perceived stress.
Caballero 2010	Cross sectional study	Commission versus receipt of violence during pregnancy: associations with substance abuse variables	73	United States	Pregnant women	Yes	Partner substance use associated with higher rates of domestic violence victimization during pregnancy.
Canfield 2021	Longitudinal cohort study	Family ties: maternal-offspring attachment and young adult nonmedical prescription opioid use	7746	United States	Adolescents	Yes	More optimal mother-young adult offspring self-reported attachment at 21 years of age associated with lower odds of prescription opioid misuse at 26 years old, which was partially mediated by adult offspring smoking, heavy episodic drinking, and illicit drug use at 23 years of age.
Cavendish 2012	Cross sectional study	Intimate partner violence: relationships between alexithymia, depression, attachment styles, and coping strategies of battered women	160	Italy	Adult females	Not reported	Women who experienced intimate partner violence more likely to exhibit alexithymia and had higher levels of depressive symptoms. Alexithymia was associated with depressive symptoms.
Cerdá 2014	Cross sectional study	Maternal adverse childhood experiences are associated with binge drinking during pregnancy in a dose-dependent pattern: Findings from the All Our Families cohort	1663	Canada	Pregnant adults	Yes	Graded relationship between ACE exposure and binge drinking both prior to and during pregnancy.
Chan 2021	Cross sectional study	Family violence and risk of substance use among Mexican adolescents	936	Mexico	Adolescents	Yes	Among Mexican adolescent females, experiencing multiple forms of family violence increased risk for tobacco, alcohol, or drugs vs. adolescents who had not experienced family violence.

(Continued)

Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Chen 2021	Cross sectional study	Maternal adverse childhood experiences, attachment style, and mental health: Pathways of transmission to child behavior problems	1994	Canada	Pregnant adults	Exclusion	Mothers who perceived their own parents as more supportive were more likely to engage in scaffolding behaviors with infants, regardless of mothers' exposure to ACEs.
Cheng 2016	Longitudinal cohort study	Maternal childhood trauma, postpartum depression, and infant outcomes: Avoidant affective processing as a potential mechanism	150	South Africa	Pregnancy cohort	Not reported	Maternal CME associated child psychiatric symptoms via maternal postpartum depression and bonding.
Choi 2014	Longitudinal cohort study	Does adolescent's exposure to parental intimate partner conflict and violence predict psychological distress and substance use in young adulthood? A longitudinal study	~4400 women, 2126 children	Australia	Mother-adolescent dyads	Yes	Women exposed to witnessed domestic violence or witnessed inter-parental conflict during childhood (measured when the offspring 14yo) were more likely to experience depressive and alcohol use disorders at 21 years of age, while males exposed to domestic violence during childhood were more likely to experience anxiety disorders at 21 years of age.
Choi 2017	Longitudinal cohort study	Drinking before and after pregnancy recognition among South African women: the moderating role of traumatic experiences	66	South Africa	Prenatal and Pregnant Adults	Yes	AUDIT scores pre- vs. post-finding out pregnant were correlated with one another. In women who had experienced intimate partner violence or who reported childhood maltreatment experiences, IPV or CME exposure moderated use patterns, such that even without hazardous drinking prior to finding out about pregnancy, women were more likely to engage in hazardous drinking who knew they were pregnant.
Chu 2010	Longitudinal cohort study	Maternal cocaine use and mother-infant interactions: Direct and moderated associations	220	United States	Mother-infant dyads	Yes	Mothers who used cocaine during pregnancy displayed greater negative affect and lower sensitivity toward their infant during play interaction at 13 months, and infants were less responsive toward them.
Coe 2020	Longitudinal cohort study	Maternal cocaine use: estimated effects on mother-child play interactions in the preschool period	343	United States	Mother-infant dyads	Yes	Less optimal parenting behaviors were exhibited during mother-child (3yo) observation among women with continued cocaine use, with greater maternal intrusiveness and hostility, poorer quality of instruction, lower maternal confidence, and diminished child persistence in the cocaine-exposed dyads.
Cooke 2019	Cross sectional study	Associations between maternal childhood maltreatment and psychopathology and aggression during pregnancy and postpartum	44	United States	Pregnant women	Exclusion	Childhood maltreatment experiences associated w/higher depression, anxiety and increased reporting of intimate partner violence exposure.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Craparo 2014	Cross sectional study	Childhood sexual abuse associated with dating partner violence and suicidal ideation in a representative household sample in Hong Kong	1154	Hong Kong	Adolescents-transitional age	Yes	Childhood sexual abuse was associated with increased risk for intimate partner violence (physical and sexual victimization) as well as increased risk for suicidal ideation, drug, and alcohol use.
Creech 2021	Cross sectional study	Maternal emotional and physical intimate partner violence and early child development: investigating mediators in a cross-sectional study in a South African birth cohort	626	South Africa	Pregnant adults	Yes	Intimate partner violence exposure associated with cognitive, motor, and language outcomes in 2 year old children, covarying for alcohol use severity in mothers.
Cunradi 2020	Longitudinal cohort study	Maternal Parenting Behaviors Amplify Environmental Influences on Developmental Trajectories of Alcohol Use During Adolescence	842	Canada	Adolescents from twin cohort followed since birth	Yes	Maternal parenting behaviors moderated impact of other assessed risks for use on longitudinal alcohol consumption trajectories of adolescents.
Currie 2020	Prospective, observational study	Associations of intimate partner violence and financial adversity with familial homelessness in pregnant and postpartum women: A 7-year prospective study of the ALSPAC cohort	14735	UK	Mother-child dyadic pregnancy cohort	Not reported	Pregnant women followed for 7 years were at increased risk for experiencing homelessness if they had experiences of financial adversity and intimate partner victimization.
Datner 2007	Longitudinal cohort study	Maternal patterns of marijuana use and early sexual behavior in offspring of teenage mothers	324	United States	Offspring of pregnant adolescents	Yes	Chronic maternal marijuana use in adolescent mothers was associated with increased likelihood of early sexual initiation in offspring (oral or vaginal sex by 14 years of age).
Dayton 2010	Cross sectional study	A National Epidemiologic Profile of Physical Intimate Partner Violence, Adverse Childhood Experiences, and Supportive Childhood Relationships: Group Differences in Predicted Trends and Associations	35614	United States	Adults	Not reported	Higher levels of ACEs associated with greater rates of intimate partner violence exposure during adulthood.
DeGenna 2015	Longitudinal cohort study	Maternal predictors of comorbid trajectories of cigarette smoking and marijuana use from early adolescence to adulthood	806	United States	Mother-adolescent dyads	Yes	Maternal risk and protective factors (maternal substance use, parent-adolescent conflict, maternal affection) associated with nicotine and marijuana use trajectories in adolescence.
DeLaRosa 2015	Cross sectional study	Maternal reflective functioning, interpersonal violence-related posttraumatic stress disorder, and risk for psychopathology in early childhood	56	Switzerland	Mother-toddler dyads	Exclusion	In a sample of mothers w/IPV-PTSD vs. non-PTSD, higher maternal reflective functioning and lower IPV-PTSD severity were associated with increased maternal sensitivity during mother-child interaction.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
deLooze 2015	Longitudinal cohort study	Conceptual model for maternal behavior among polydrug cocaine-using mothers: the role of postnatal cocaine use and maternal depression	130	United States	Mother-infant dyads (+/- prenatal cocaine exposure)	Yes	Mothers with postnatal cocaine use exhibited lower maternal sensitivity and higher levels of depressive/anxiety symptoms. Prenatal cocaine, cigarette, and binge drinking were associated with postnatal depressive symptoms but not w/ maternal sensitivity. By contrast, postnatal substance use including cocaine and binge drinking were both associated with lower maternal sensitivity in multivariate models.
Dishon-Brown 2017	Longitudinal cohort study	Maternal substance use in pregnancy: Differential prediction by childhood adversity subtypes	1994	Canada	Pregnant adults	Yes	Dose-response relationship between substance use during pregnancy and number of adverse childhood experiences.
Dube 2001	Longitudinal cohort study	Maternal symptoms of depression and sensitivity mediate the relation between maternal history of early adversity and her child temperament: The inheritance of circumstance	239	Canada	Mother-infant dyads	Not reported	Maternal depression and maternal sensitivity mediate and indirect effect of maternal ACEs on infant negative emotionality.
Ehrensaft 2012	Longitudinal cohort study	Maternal trauma and emotional availability in early mother-infant interaction: findings from the Mercy Pregnancy and Emotional Well-being Study (MPEWS) cohort	211	Australia	Pregnant adults	Exclusion	Maternal CME as well as perinatal trauma exposure was associated with lower emotional availability.
Eiden 2006	Cross sectional study	Mood disorders affect drug treatment success of drug-dependent pregnant women	222	United States	Pregnant adults stabilized on methadone	Yes	In pregnant (primarily African American) women on stable methadone dose for OUD treatment, mood disorders associated with higher rates of relapse and more functional impairment vs. those without mood disorders.
Eiden 2011	Longitudinal cohort study	Mother-infant interaction at 12 months in prenatally cocaine-exposed children	112	United States	Pregnant adults	Yes	Children with prenatal cocaine exposure exhibited more disengagement following reunion during mother-child separation procedure vs. unexposed children, with no differences based on level of exposure.
Escribà-Agüir 2013	Other: epidemiological study	Economic contraction and maternal health behaviors during pregnancy in a national sample of U.S. women	7074 births to 3975 women	United States	Adolescent-transitional age pregnant people	Yes	Among Black/non-Hispanic women, exposure to economic contraction during the first and second trimester of pregnancy were associated with a 42% and 33% increased risk of alcohol use, respectively compared to other racial/ethnic groups.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Fitzsimons 2007	Cross sectional study	Mother-to-infant bonding failure and intimate partner violence during pregnancy as risk factors for father-to-infant bonding failure at 1 month postpartum: an adjunct study of the Japan Environment and Children's Study	2005	Japan	Postpartum people and their partners	Not reported	Mothers experiencing intimate partner violence from fathers had lower rates of mother-infant bonding, as did fathers have lower rates of father-infant bonding.
Fuller-Thomson 2016	Cross sectional study	Associations of physical partner violence and sexual violence victimization on health risk behaviours and mental health among university students from 25 countries	800	Multiple countries	Undergraduate students	Yes	Exposure to intimate partner violence associated with increased rates of binge drinking in women, as well as increased chance for riskier sexual behaviors, and alcohol use in the context of sex.
Gao 2010	Cross sectional study	Cumulative Violence Exposure and Alcohol Use Among College Students: Adverse Childhood Experiences and Dating Violence	3710	US + Canada	University students	Yes	Higher rates of alcohol use and problematic drinking patterns associated with higher cumulative exposure to interpersonal trauma and violence as well as with higher burden associated with increased alcohol problems.
Gattamorta 2017	Cross sectional study	Mother's exposure to domestic and community violence and its association with child's behavioral outcomes	2506	United States	Mothers from birth cohort	Yes	Maternal witnessing of community violence or experiencing psychological intimate partner violence directly associated with offspring depression and anxiety symptoms.
Gavin 2011	Cross sectional study	Mothers' Adult Attachment Interview ratings predict preschool children's IQ following domestic violence exposure	92	United States	Mother-toddler dyads	Exclusion	In mothers who had experienced intimate partner violence, their attachment profiles were associated with preschool child outcomes (IQ measures), such that more secure attachment in mothers was associated with better outcomes.
Gillmore 2006	Longitudinal cohort study	Mothers' violence victimization and child behavior problems: Examining the link	197	United States	Mother-infant dyads recruited in 1st year of infant's life, recruited specifically from neighborhoods w/ higher frequency of CPS reports	Yes	Mothers' history of childhood victimization was associated w/child behavioral problems.
Grest 2022	Longitudinal cohort study	Women who gave birth as unmarried adolescents: trends in substance use from adolescence to adulthood	240	United States	Unmarried pregnant adolescents	Yes	On average mothers did not decrease substance use (except for alcohol) going into adulthood, and used more on average than a same-age group of adolescent females who were not mothers.
Griffing 2006	Qualitative research	Motivation for alcohol consumption or abstinence during pregnancy: A clinical-qualitative study in Brazil	14	Brazil	Pregnant women	Yes	Qualitative study assessed motives for substance use during pregnancy which included coping with stress and social isolation.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Hare 2009	Cross sectional study	Neighborhood disadvantage moderates the effect of perinatal intimate partner violence (IPV) exposure on disorganized attachment behaviors among 12-month-old infants	78	United States	mother-infant dyads from urban communities in greater Chicago area	Not reported	Neighborhood disadvantage moderated effect of maternal perinatal exposure to intimate partner violence on infant disorganized attachment, with a significant effect of IPV on attachment behaviors only at high levels of neighborhood disadvantage.
Hatzis 2019	Cross sectional study	A prospective cohort study of the impact of domestic violence on young teenage pregnancy outcomes	537	Australia	Pregnant adolescents	Yes	Among adolescent mothers, victims of domestic violence more likely to use substances, higher rates of unplanned pregnancies, and higher rates of complications (obstetric/neonatal).
Heider 2007	Prevalence/incidence of risk factors	Contraceptive Need, Intimate Partner Violence, and Reproductive Coercion Among Women Attending a Syringe Exchange Program	96	United States	Adult women attending syringe exchange program	Yes	Among women accessing a syringe exchange program, 62% reported experiencing reproductive or intimate partner violence within the past 3 months, 50% reported prior unintended pregnancy, and 62% didn't use contraception during last sexual experience with a man. Further, experiencing reproductive coercion or intimate partner violence was not associated with contraceptive use/unintended pregnancy. 56% of participants reported interest in receiving contraceptive care from the syringe exchange program.
Herbert 2020	Qualitative research	How children affect the mother/victim's process in intimate partner violence	32	United States	Mothers living in intimate partner violence shelters/participating in support groups	Not reported	More than one-half of mothers studied reported their child's actions/behaviors led them to seek help for intimate partner violence exposure. Further, mothers noted fear of being reported to child protective services.
Huth-Bocks 2013	Longitudinal cohort study	Once and Again : History of Rearing Experiences and Psychosocial Parenting Resources at Six Months in Primiparous Mothers	201	Canada	First-time mothers	Not reported	Primiparous mothers reporting childhood maltreatment experiences were more likely to report increased parenting stress via multiple pathways: (1) CM -> maternal dep symptoms -> parenting stress; (2) PBI (maternal rearing) -> maternal motivation and maternal dep symptoms -> parental stress.
Johnson 2002	Longitudinal cohort study	Ongoing maternal drug use, parenting attitudes, and a home intervention: effects on mother-child interaction at 18 months	227	United States	Drug-using women and their infants	Yes	Ongoing maternal substance use was associated with less optimal parenting behaviors.
Kendler 2013	Cross sectional study	How do maternal PTSD and alexithymia interact to impact maternal behavior?	56	Switzerland	Mother-toddler dyads	Exclusion	Maternal PTSD symptoms (particularly dissociative and hyperarousal symptoms) and alexithymia were both associated with lower maternal sensitivity toward one's infant.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Khoury 2022	Longitudinal cohort study	Parent and peer pathways linking childhood experiences of abuse with marijuana use in adolescence and adulthood	357	United States	Participants from Lehigh Longitudinal Study	Yes	Higher risk for cannabis use in adolescents exposed to childhood sexual abuse. If exposed as preschoolers, more likely to use cannabis during adulthood.
Kim 2010	Longitudinal cohort study	Parent attachment, school commitment, and problem behavior trajectories of diverse adolescents	179	United States	Predominately minority adolescents	Yes	Increased attachment to parents associated with reduced alcohol use at multiple study timepoints. Race/ethnicity and gender with teacher-reported adolescent problem behaviors, with higher severity of problem behaviors reported in youth of color. Student self-reports also indicated that adolescent frequency of alcohol use increases over time.
Klasner 2022	Longitudinal cohort study	Parent-adolescent relationship characteristics and adolescent cannabis use: A growth curve analysis	110	United States	Adolescents and their caregiver	Yes	Cannabis use continued to increase over time regardless of parent-adolescent relationship quality, but during timepoints when parents reported higher levels of frustration, cannabis use was higher in adolescents.
Kobayashi 2021	Cross sectional study	Parental bonding and suicidality in adulthood	7740	Multiple countries	Adults	Yes	Maternal and paternal care was associated with lower rates suicidality during adulthood. Alcohol use was also associated w/higher rates of suicidality.
KoLing 2011	Cross sectional study	Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the Adverse Childhood Experiences Study	17337	United States	Adults	Yes	The relationship between suicide attempts and ACEs across lifespan was partially mediated by 3 factors - depressive symptoms, illicit drug use, and "alcoholism."
Krans 2013	Cross sectional study	Parental bonding, adult attachment, and theory of mind: A developmental model of alexithymia and alcohol-related risk	286	Australia, New Zealand, United States, UK, South Africa	Undergraduate students using alcohol	Yes	Higher levels of alcohol use in college students were associated with insecure attachment, alexithymia, and less optimal self-report of relationships with their parents.
Lang 2006	Longitudinal cohort study	Parental Psychiatric Disease and Risks of Attempted Suicide and Violent Criminal Offending in Offspring: A Population-Based Cohort Study	#####	Denmark	30-y population based cohort	Yes	Cannabis misuse in parents associated with higher risk for suicide and violent offending during adulthood.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Lee 2016	Prevalence/incidence of risk factors	Parental status and characteristics of women in substance use treatment services: Analysis of electronic patient records	4370	UK	Females enrolled in substance use treatment	Yes	In mothers enrolled in substance use treatment, 37.5% of mothers reported their child was in alternative care (with a large fraction of moms not reporting status of children). Compared to women without children, mothers more likely to be young, to experience housing problems, to have past-28 days opioid and/or crack-cocaine use, and to experience lifetime domestic violence victimization.
Leitenberg 2004	Longitudinal cohort study	Parenting and Home Environment in Childhood and Adolescence and Alcohol Use Disorder in Adulthood	1068	New Zealand	Offspring from birth cohort followed through adulthood	Yes	Positive parenting was linked to decreased risk for AUD/excessive drinking across adolescence through transitional age, and this relationship was mediated by life stress, mental health, and employment.
Levendosky 2011	Prevalence/incidence of risk factors	Partner violence impacts the psychosocial and psychiatric status of pregnant, drug-dependent women	92	United States	African American females seeking substance use treatment	Yes	Women reporting exposure to intimate partner violence were more likely to have higher severity of substance use, psychiatric illnesses, and suicidal ideation/attempts vs. women not reporting exposure.
Lindhorst 2011	Longitudinal cohort study	Pathways from Maternal Adverse Childhood Experiences to Substance Use in Pregnancy: Findings from the All Our Families Cohort	1994	Canada	Pregnant adults	Yes	Dose-response relationship between substance use during pregnancy and number of adverse childhood experiences, which was moderated by education, depressive symptoms and history of substance use prior to pregnancy.
Locke 2008	Prevalence/incidence of risk factors	Pathways from witnessing parental violence during childhood to involvement in intimate partner violence in adult life: The roles of depression and substance use	4607	Brazil	Adolescents-transitional age	Yes	Witnessing parental violence was associated with higher rates of intimate partner violence exposure during adulthood. Individuals are 2x likely to report depressive symptoms, 3x as likely to use cocaine, and 2x as likely to report having alcohol use disorder during adulthood, as well as being younger at initiation of alcohol use. Witnessing domestic violence during childhood associated with higher risk for experiencing intimate partner violence, adjusting for sex, age, education and SES, regardless of whether person suffered direct violence. Association survived adjustment for depressive symptoms, as well as for cocaine and alcohol use.
Lowe 2017	Cross sectional study	Patterns of Maternal Childhood Maltreatment and Disrupted Interaction Between Mothers and Their 4-Month-Old Infants	179	United States	Mother-infant dyads	Not reported	Mothers' maltreatment experiences were associated with differences in how mothers responded to their own infants.
Lyons-Ruth 2013	Longitudinal cohort study	Personal and psychosocial predictors of psychological abuse by partners during and after pregnancy: a longitudinal cohort study in a community sample	1400	Spain	Pregnant adults	Yes	Lower affective social support and partner/family member substance use was associated with higher risk for intimate partner violence during the perinatal period.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Lyvers 2019	Cross sectional study	Adverse impact of multiple separations or loss of primary caregivers on young children	246	United States	Parents and toddlers	Not reported	Children experiencing multiple separations and/or losses of their caregivers (while covarying for childhood trauma, poverty, and other potential confounders) exhibited more severe deficits in socioemotional development.
MacMillan 2021	Longitudinal cohort study	Adolescent predictors of alcohol use in adulthood: A 22-year longitudinal study	674	United States	Adolescents	Yes	Parental alcohol use during late adolescence associated with lower parent child attachment, more non-prosocial behaviors, and lower school engagement, each of which in turn was associated with adolescent alcohol use.
Madkour 2010	Longitudinal cohort study	Borderline symptoms and suicidality/self-injury in late adolescence: prospectively observed relationship correlates in infancy and childhood	56	United States	Mother-adolescent dyads followed since infancy	Yes	Both maternal behaviors and history of early abuse were associated w/borderline symptoms in later adolescence in a higher risk low-income cohort of mothers and adolescents followed since infancy.
Madruaga 2017	Prevalence/incidence of risk factors	Alcohol, Cigarette, and Cannabis Use Between 2002 and 2016 in Pregnant Women From a Nationally Representative Sample	12 058	United States	Pregnant adults	Yes	Substance use including alcohol and tobacco decreased during pregnancy, with slight increase in cannabis use, primarily evident during first trimester.
Manning 2014	Cross sectional study	Physical aggression in the family and preschoolers' use of the mother as a secure base	45	United States	Parent-toddler dyads	Not reported	Children in families with intimate partner violence exposure are more likely to exhibit insecure attachment.
Manzoli 2010	Longitudinal cohort study	An ecological momentary assessment study examining posttraumatic stress disorder symptoms, prenatal bonding, and substance use among pregnant women	33	United States	Pregnant women in SUD treatment with prior trauma exposure	Yes	Among pregnant women, there was a moderate association between peak daily PTSD symptoms and substance use (for illicit, tobacco, and cannabis use).
Margerison-Zilko 2014	Prevalence/incidence of risk factors	Physical violence against U.S. women around the time of pregnancy, 2004-2007	134 955	United States	Adult females	Yes	One of the top 3 risk factors for experiencing lifetime IPV was being close to someone with an alcohol or drug problem.
Mark 2017	Cross sectional study	Correlates and predictors of HIV risk among inner-city African American female teenagers.	242	United States	Community sample of adolescent African American females who were recently or currently pregnant	Yes	Greater number of sexual partners was associated with higher levels of personal drug or alcohol use, higher levels of parental alcohol use, younger age at first intercourse. Greater number of pregnancies in teens associated with higher levels of parental alcohol use.
Martin 2003	Longitudinal cohort study	Postpartum depression and resilience predict parenting sense of competence in women with childhood maltreatment history	131	United States	Pregnant and postpartum adults	Exclusion	Mother's well-being postpartum moderated effect of her childhood maltreatment history on sense of parenting competence.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Martinelli 2019	Cross sectional study	An Investigation of the Impact of Childhood Trauma on Quality of Caregiving in High Risk Mothers: Does Maternal Substance Misuse Confer Additional Risk?	51	Australia	Mother-toddler dyads	Yes	Moms from both groups (one recruited from support agencies and a second sample of mothers moms using substances) had higher degree of borderline traits, childhood trauma, environmental risk, and lower emotional availability toward offspring vs. community comparison mothers and level of impairment was similar for both mothers with lower resources and those using substances.
Martinez-Torteya 2018	Cross sectional study	Pregnant Women's Current and Intended Cannabis Use in Relation to Their Views Toward Legalization and Knowledge of Potential Harm	306	United States	Pregnant adults	Yes	The most common reasons for stopping cannabis use during pregnancy included to be an example to child, to avoid child protective services referral, concern for harm to pregnancy. In obstetric clinic, one-third of women were using cannabis prior to pregnancy, and of those one-third continued use during pregnancy.
Martinez-Torteya 2021	Retrospective cohort study	Postpartum depression in adolescent and adult mothers: comparing prenatal risk factors and predictive models	6959	United States	Rhode Island Pregnancy Risk Assessment Monitoring System	Yes	Higher rates of perinatal depression with prenatal alcohol use in adolescent moms.
Massey 2011	Data from larger longitudinal study with cross-sectional elements	Prenatal and postnatal intimate partner violence, depression, and infant-mother touch	174	United States	Pregnant adults	Not reported	Frequency of aggressive touch by male infants toward parent was associated with maternal exposure to intimate partner violence.
McCloskey 2013	Longitudinal cohort study	Prenatal Substance Exposure and Developmental Trajectories of Internalizing Symptoms: Toddlerhood to Preadolescence	1803	United States	mother-infant dyads	Yes	Postnatal alcohol use associated w/trajectory of child internalizing symptoms in children with prenatal substance exposures from toddler years through adolescence. Girls more likely to be in chronic trajectory, whereas, boys were more likely to be in lower risk trajectory.
McGee 2000	Cross sectional study	Developmental delay in communication among toddlers and its relationship to caregiving behavior among violence-exposed, posttraumatically stressed mothers	61	Switzerland	Mother-toddler dyads	Exclusion	Lower quality of maternal behavior associated with IPV-PTSD severity.
Meyers 2018	Cross sectional study	Psychiatric Symptoms, Parental Attachment, and Reasons for Use as Correlates of Heavy Substance Use Among Treatment-Seeking Hispanic Adolescents	156	United States	Adolescents	Yes	Higher social benefit associated w/increased risk for heavy alcohol use and stronger mother-adolescent attachment. Low acculturation associated w/increased risk for illicit substance use.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Min 2021	Longitudinal cohort study	Psychological dysregulation during adolescence mediates the association of parent-child attachment in childhood and substance use disorder in adulthood	694	United States	Adolescents	Yes	Psychological dysregulation mediated association between self-reported attachment to mothers and adolescent substance use disorders, and partially mediated association between self-reported attachment to fathers and adolescent substance use disorders. Significant mediation effects remains after including baseline substance use in model.
Minnes 2005	Cross sectional study	Psychosocial risk, prenatal counseling and maternal behavior: findings from PRAMS, 2004-2008	198 323	United States	Postpartum people	Yes	Decreased use of tobacco and ETOH cessation following prenatal counseling but no change in involvement in relationships impacted by intimate partner violence.
Minnes 2008	Cross sectional study	Psychosocial stress during pregnancy	1522	United States	Pregnant adults	Yes	Alcohol/drug use, domestic violence, two or more medical problems, depression, or panic disorder were associated w/higher self-reported stress during pregnancy.
Mok 2016	Cross sectional study	Attachment style, early sexual intercourse, and dating aggression victimization	158	Canada	Undergraduate female (25 years or younger)	Yes	Negative study which did not demonstrate that anxious attachment added to the model assessing association between intimate partner violence victimization and early age at sexual initiation. Women reporting childhood maltreatment experiences were more likely to exhibit anxious attachment and exposure to intimate partner violence.
Molina 2011	Prevalence/incidence of risk factors	Racial Disparities in Intimate Partner Violence Examined Through the Multiple Disadvantage Model	6588	United States	Adult females	Yes	Illicit substance use associated with higher rates of physical intimate partner violence victimization in African American and Latina women but not in European women.
Molitor 2003	Cross sectional study	Relational trauma and posttraumatic stress symptoms among pregnant women	120	United States	Pregnant adults	Not reported	Childhood maltreatment was associated with higher levels of exposure to intimate partner violence and each explained unique variance in PTSD symptoms.
Nishigori 2020	Cross sectional study	Childhood Victimization, Attachment, Coping, and Substance Use Among Victimized Women on Probation and Parole	406	United States	Criminal-justice involved women (probation or parole)	Yes	Criminal-justice involved women had lifetime exposure to on average >12 partners' psychological abuse and >2 incidents of sexual victimization.
Noll 2009	Cross sectional study	Reproductive coercion, intimate partner violence, and pregnancy risk among adolescent women with a history of foster care involvement	136	United States	Adult females	Yes	Females who had experienced reproductive coercion were more likely to have experienced physical or sexual intimate partner violence, to use alcohol or drugs prior to sex, to have a male sex partner 5+ y older than them, and to have experienced unintended pregnancy.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Nunes 2013	Cross sectional study	Risk factors associated with different types of intimate partner violence (IPV): an emergency department study	412	United States	Adults seen in the emergency department	Yes	Reports of intimate partner violence more common with past 12-month report of binge drinking, drug use, or lifetime history of witnessed domestic violence.
Ørke 2021	Longitudinal cohort study	Dimensions of parental alcohol use/problems and offspring temperament, externalizing behaviors, and alcohol use/problems	14,093	UK	Mother-child dyadic pregnancy cohort	Yes	Alcohol consumption and alcohol problems at age 18 were more strongly predicted by parental factors than at age 15. Maternal alcohol consumption during pregnancy uniquely predicted externalizing traits at ages 4, 13 and 15, while including other alcohol factors in model.
Orr 2008	Study utilizing multiple cohorts	Risk factors for adolescent marijuana use across cultures and across time	3303	United States	Mother-adolescent dyads	Yes	Greater odds of adolescent marijuana use associated with poorer parent-adolescent relationships and adolescent depressive symptoms.
Pajulo 2012	Cross sectional study	Attachment styles, social behavior, and personality functioning in romantic relationships	260	United States	Couples selected for high PD severity	Yes	Severity of personality disorders and relationship dissatisfaction within couples (both w/personality disorders) were associated with relationship between anxious and withdrawal attachment styles.
Pallatino 2021	Longitudinal cohort study	Risk factors for intimate partner violence and abuse among adolescents and young adults: findings from a UK population-based cohort	3279	UK	Mother-child dyadic pregnancy cohort	Yes	ACEs prior to 16 years of age were associated with higher risk for intimate partner violence victimization. Risks were highest in male and female participants who had self harmed by age 16, had engaged in risky sexual behavior by age 17, regularly used cannabis or other illicit drugs by age 16, or had been sexually abused (not by intimate partner), or if parents had separated by age 16.
Pearson 2012	Cross sectional study	Identifying pregnant women experiencing domestic violence in an urban emergency department	1174	United States	Women having sought care in emergency room for spontaneous abortion	Yes	Women who reported current violence exposure were more likely to use drink alcohol or use substances, to be <20yo, and to have lower than high school level of education.
Peltzer 2015	Longitudinal cohort study	A longitudinal study of cannabis use and mental health from adolescence to early adulthood	1037	New Zealand	Adults	Yes	Cannabis use at 15 years old and 18 years old associated with increased risk for mental health diagnoses at 15, 18, and 21 years old, while mental health disorder diagnoses at 15 years old were associated with cannabis use at 18 years of age.
Pengpid 2020	Cross sectional study	Contribution of family violence to the intergenerational transmission of externalizing behavior	801	United States	Multi-generational mother-infant dyad cohort	Yes	In an multi-generational study, both maternal childhood physical abuse and exposure to intimate partner violence during adulthood was associated w/offspring externalizing symptoms during middle childhood.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Perry 2020	Prevalence/ incidence of risk factors	Romantic attachment as a mediator of the relationships between interpersonal trauma and prenatal representations.	206	United States	Women in 3rd trimester recruited from Mid-Michigan area	Not reported	Exposure to intimate partner violence was associated with poorer adult attachment though not indirectly associated with prenatal working models.
PettyJohn 2021	Longitudinal cohort study	Self-regulation and emotional reactivity in infants with prenatal exposure to opioids and alcohol	100	United States	Mother-child dyads	Yes	Mothers on medication assisted treatment for OUD and who consumed alcohol had infants with lower self-regulation compared to those solely on MAT, solely consuming alcohol, or those with neither. Higher infant self regulation associated w with lower infant negative affect only in this group.
Plant 2017	Cross sectional study	Impact of adverse childhood experiences on women's psychosocial and HIV-related outcomes and early child development in their offspring	353	South Africa	Adult women with HIV in the early postpartum	Yes	Higher levels of ACEs associated with multiple risk factors including hazardous alcohol use, poor adherence to HIV treatment, and exposure to intimate partner violence. ACEs associated with poorer mother-reported toddler socioemotional developmental outcomes.
Posada 2008	Descriptive study	Social support systems of women offenders who use drugs: a focus on the mother-daughter relationship	100	United States	Women with criminal justice system involvement	Yes	Among women with correctional system involvement and substance use, 23% and 61%, respectively, started using prior to 13yo vs. 13-18yo, with 16% initiating use after 18 years of age.
Pro 2020	Longitudinal cohort study	Substance use and mental health disorders are linked to different forms of intimate partner violence victimisation	1781	Australia	Mother-offspring dyads followed through adulthood	Yes	Substance use associated with exposure to intimate partner violence.
Quiniivan 2001	Cross sectional study	Adult Attachment Styles, Destructive Conflict Resolution, and the Experience of Intimate Partner Violence	216	Spain	Heterosexual adults	Not reported	People with anxious or avoidant attachment at higher risk for experiencing sexual coercion or prolonged psychological abuse.
Quiniivan 2005	Prevalence/ incidence of risk factors	Adverse childhood experiences and marijuana use during pregnancy: Findings from the North Dakota and South Dakota PRAMS, 2017-2019	5399	United States	Pregnant adolescents	Yes	Women reporting adverse childhood experiences were more likely to use marijuana during perinatal period.
Racine 2020	Longitudinal cohort study	Attachment Anxiety as a Risk Factor for Subsequent Intimate Partner Victimization: A 6-Month Prospective Study Among College Women	133	United States	Undergraduate women experiencing intimate partner violence	Yes	Attachment anxiety was a risk factor for exposure to intimate partner violence at 6mo follow up in shorter longitudinal study.
Racine 2021	Cross sectional study	Attachment as a Moderator Between Intimate Partner Violence and PTSD Symptoms	174	United States	Heterosexual couples	Yes	Attachment anxiety associated with higher risk for exposure to intimate partner violence, even while adjusting for prior IPV exposure.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Roth 2021	Cross sectional study	Substance use before and during pregnancy: links to intimate partner violence	85	United States	Pregnant adults	Yes	Association between pre-pregnancy and during pregnancy substance use and exposure to intimate partner violence both pre- and during pregnancy.
Rothman 2008	Longitudinal cohort study	Substance-Abusing Mothers in Residential Treatment with their Babies: Importance of Pre- and Postnatal Maternal Reflective Functioning	34	Finland	Mother-infant dyads	Yes	Maternal reflective functioning increased during substance use treatment, and that mothers with higher reflective functioning were less likely to relapse; trauma also related to outcomes.
Rousfit 2009	Longitudinal cohort study	Caregiver traumatization adversely impacts young children's mental representations on the MacArthur Story Stem Battery	49	United States	Mothers and their young children	Yes	Mothers' exposure to greater severity of intimate partner violence (order of protection filed) and higher levels of PTSD symptoms were associated with greater themes of dysregulated aggression, hypervigilance to danger and distress, avoidance and withdrawal from interpersonal conflict and associated negative affects, as well as narrative incoherence in childrens' MacArthur Story Battery responses.
Salom 2015	Cross sectional study	Adverse childhood experiences are associated with at-risk drinking, cannabis and illicit drug use in females but not males: an Emergency Department study	1037	United States	Married/partners adults seen in emergency room	Yes	Among young adult females, those with higher levels of ACEs were more likely to use cannabis or illicit substances and those who witnessed DV toward their mother during childhood were more likely to engage in binge drinking.
Sandberg 2019	Longitudinal cohort study	The association of prenatal cocaine use and childhood trauma with psychological symptoms over 6 years	402	United States	Mother-infant dyads (+/- prenatal cocaine exposure)	Yes	Women using cocaine during pregnancy exhibited higher levels of stress, interpersonal sensitivity, psychoticism, and anxiety symptoms. Higher levels of cocaine use in mother reporting childhood physical or emotional neglect exposure.
Sanjuan 2019	Longitudinal cohort study	The child as held in the mind of the mother: The influence of prenatal maternal representations on parenting behaviors	164	Australia	Pregnant adults	Not reported	Mothers with less balanced attachment representations of their infant engaged in less optimal parenting behaviors toward infants. This association was not moderated by recent experiences of intimate partner violence.
Sanjuan 2020	Longitudinal cohort study	The cumulative burden borne by offspring whose mothers were sexually abused as children: descriptive results from a multigenerational study	166	United States	Multi-generational mother-infant dyad cohort	Yes	Offspring born to mothers with histories of sexual abuse were more likely to be born preterm, to have an adolescent mother, and to be involved in protective services. Mothers reporting prior sexual abuse were more likely to have left high school early, to have obesity, and to have experienced psychiatric problems, substance use, and exposure to intimate partner violence.

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STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Schechter 2007	Longitudinal cohort study	The effect of prenatal substance use and maternal contingent responsiveness on infant affect	91	United States	Pregnant adults	Yes	When examining 91 mother-infant dyads with varying types of prenatal substance exposure (medication-assisted therapy for OUD and alcohol, medication-assisted therapy alone, alcohol alone, no exposure), during the Still Face Paradigm, contingent responding was associated with less infant negative affect, and maternal attention-seeking was associated with more negative infant affect. Further, combined effects of prenatal exposures and covariates explained 15.8% variability in infant positive affect, while the model including contingent responding and covariates explained 67.1% of the variability.
Schechter 2008	Longitudinal cohort study	The effects of domestic violence on the stability of attachment from infancy to preschool	150	United States	Mothers and infants/toddlers	Not reported	Exposure to domestic violence associated with unstable mother-infant relationship quality between 1->4 yo.
Schechter 2015	Longitudinal cohort study	Effects of prenatal cocaine/polydrug use on maternal-infant feeding interactions during the first year of life	415	United States	Mother-infant dyads	Yes	Women using cocaine during pregnancy exhibited lower sensitivity to their infants postpartum. Higher levels of current cocaine use (biological measurement) were associated with decreased responsiveness to infant cues.
Schiff 2014	Cross sectional study	Adverse childhood experiences predict earlier age of drinking onset: results from a representative US sample of current or former drinkers	3592	United States	Adults	Yes	Among early-mid adults, reporting one of the following 5 adverse childhood experiences (physical assault, sexual assault, parental discord/divorce, parental mental health diagnoses, parental substance use) exposure to ACEs was associated w/earlier onset of alcohol use (<=14yo vs. >=21yo), and people w/ACEs more likely to report drinking to cope.
Schuler 2002	Longitudinal cohort study	The effects of exposure to violence and victimization across life domains on adolescent substance use	1655	United States	Adolescents	Yes	Adolescent exposure to various types of abuse/violence was associated with future cannabis use.
Scott 2010	Longitudinal cohort study	The impact of alcohol use during pregnancy on maternal responses after birth	687	UK	Mother-infant dyads	Yes	Use of >=1 glass/week of alcohol vs. none during mid-pregnancy associated w/lower maternal responsiveness (higher frequency of maternal neutral affect toward infants) at one year postpartum.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Smagur 2017	Cross sectional study	The impact of exposure to parental intimate partner violence on adolescent precocious transitions to adulthood	33 360	United States	Adults	Yes	People exposed to witnessed domestic violence during childhood were at higher risk of precocious transitions to adulthood, including engaging in early sex dropping out of high school, early parenthood. Females at higher risk for early sexual initiation. Dose-response effect between severity of witnessed domestic violence and increase in risk for precocious transitions.
Smith 2016	Longitudinal cohort study	The impact of intimate partner violence on preschool children's peer problems: An analysis of risk and protective factors	7712	UK	Mother-child dyadic pregnancy cohort	Not reported	Witnessed domestic violence in preschoolers associated with problems interacting with peers.
Speranza 2021	Cross sectional study	Childhood interpersonal violence and adult alcohol, cannabis, and tobacco use disorders: variation by race/ethnicity?	36 309	United States	Adults	Yes	Among Hispanic women and American Indian men, association between alcohol use disorder and witnessed parental violence were stronger compared to other racial/ethnic groups.
Stover 2018	Longitudinal cohort study	The intergenerational transfer of mother-daughter risk for gender-based abuse	150	United States	Mothers with intimate partner violence	Not reported	Witnessed domestic violence during childhood in females increased likelihood for exposure to physical and sexual intimate partner violence in adulthood.
Strauss 2001	Qualitative research	The intersection of intimate partner violence and substance use among women with opioid use disorder	40	United States	Pregnant or postpartum people with opioid use disorder	Yes	Women reported that they felt that partners' substance use was related to incidents of intimate partner violence, that emotional abuse from partners prevented treatment engagement and financial abuse inhibited their independence. Further they reported that they used substances to cope with experiences of intimate partner violence.
Suardi 2020	Longitudinal cohort study	Emotion regulation behavior during a separation procedure in 18-month-old children of mothers using cocaine and other drugs	78	United States	Mother-infant dyads with prenatal cocaine exposure	Yes	During Strange Situation separation at 18mo postpartum, mothers with prenatal cocaine use exhibited lower engagement with offspring vs. mothers not using cocaine. Infants with prenatal cocaine exposure exhibited lower negative reactivity during separation and lower positive engagement at reunion vs. other infants. Infant reactivity was associated with maternal co-use of higher levels of alcohol, and infant engagement was also associated with birthweight and maternal behaviors.
Testa 2022	Longitudinal cohort study	The long arc of recovery: characterizing intimate partner violence and its psychosocial effects across 17 years	205	United States	Unmarried pregnant adolescents	Yes	Effects of intimate partner violence exposure persisted through young adulthood in a cohort of adolescent mothers, resolving by 30 years of age, and was associated with higher rates of alcohol use.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Than 2005	Longitudinal cohort study	The Moderating Role of Attachment on the Association between Childhood Maltreatment and Adolescent Dating Violence	150	United States	Adolescents	Yes	Adolescents with childhood maltreatment experiences and avoidant attachment were at higher risk for exposure to intimate partner violence.
Thomas 2020	Longitudinal cohort study	The Moderating Role of Attachment on the Relationship Between History of Trauma and Intimate Partner Violence Victimization	93	United States	Women with intimate partner violence enrolled in police advocacy program	Not reported	Level of attachment anxiety was associated with higher rates of revictimization.
Thompson 2007	Cross sectional study	The process of coping with domestic violence in adult survivors of childhood sexual abuse	219	United States	Women who have experienced intimate partner violence	Not reported	Young adults with history of sexual abuse employed more disengaged coping strategies to deal with IPV experiences, with no differences by race/ethnicity in coping.
Torrizi 2018	Longitudinal cohort study	Exposure to interparental violence and psychosocial maladjustment in the adult life course: advocacy for early prevention	3023	France	Adults	Yes	People with witnessed domestic violence during childhood have higher risk for intimate partner violence exposure and alcohol use disorder during adulthood.
Tuten 2004	Cross sectional study	The Role of Complex Trauma and Attachment Patterns in Intimate Partner Violence	179	Italy	Women who have experienced intimate partner violence	Not reported	Early maltreatment experiences more common in women exposed to intimate partner violence, though this relationship was explained more by the presence of disorganized states of mind regarding attachment.
Tzilos 2010	Longitudinal cohort study	The role of maternal early-life and later-life risk factors on offspring low birth weight: findings from a three-generational study	132	United States	Mothers and their children (followed from 10 years old through adolescence)	Yes	In a multi-generational study, early childhood abuse among G2 responders predicted G3 offspring birth weight through a mediated pathway including G2 adolescent substance use and G2 prenatal substance use. Birth weight was unrelated to maternal adult SES, depression or obesity.
Ukeje 2001	Cross sectional study	Three Types of Adverse Childhood Experiences, and Alcohol and Drug Dependence Among Adults: An Investigation Using Population-Based Data	21 544	Canada	Adolescents and adults	Yes	Higher rates of substance use disorders in people reporting exposure to childhood maltreatment, an effect which persisted even while adjusting for exposure to multiple types of adversity.
Unternaehrer 2019	Cross sectional study	Attachment Characteristics Among Women Victimized in No, One, and Multiple IPV Relationships: A Case-Control Study	154	Norway	Adult women	Yes	Higher attachment anxiety associated with intimate partner violence, with dose-response relationship. Childhood sexual assault was independent risk factor for intimate partner violence exposure.

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Table 1. (Continued)

STUDY ID	DESIGN	TITLE	TOTAL N	LOCATION	STUDY POPULATION	SUBSTANCE USE DATA?	FINDINGS
Viellas 2013	Longitudinal cohort study	Association between maternal childhood trauma and offspring childhood psychopathology: mediation analysis from the ALSPAC cohort	9397	UK	Mother-child dyadic pregnancy cohort	Yes	Maternal childhood maltreatment experiences associated with offspring internalizing and externalizing behaviors, antenatal drinking, or smoking, with antenatal or postnatal depression, and offspring maltreatment.
Woods 2010	Longitudinal cohort study	Trajectories of maternal harsh parenting in the first 3 years of life	488	United States	Mother-infant dyads	Yes	There was a significant increase in harsh parenting from birth to age 3. Maternal childhood maltreatment and maternal alcohol use were associated with harsh parenting. Partner aggression was associated with harsh parenting at each timepoint.
Wright 2013	Observational cross-sectional study	Understanding depressive symptoms among high-risk, pregnant, African-American women	1044	United States	Black pregnant adults	Yes	Multiple social determinants of health including exposure to intimate partner violence, educational level, and illicit substance use were associated with higher levels of depressive symptoms during pregnancy in African American women.
Yarkovsky 2014	Cross sectional study	Attachment insecurity mediates the effects of intimate partner violence and childhood maltreatment on depressive symptoms in adult women.	206	United States	Women in tri-county area in midwest in 3rd trimester of pregnancy	Not reported	Mothers' childhood maltreatment experiences and exposure to intimate partner violence exhibited independent effects on depressive symptoms.
Zhai 2014	Cross sectional study	Unintended pregnancy and prenatal behaviors among urban, black women in Baltimore, Maryland: the Baltimore preterm birth study	913	United States	Black pregnant adults	Yes	Unintended pregnancy was associated w/ greater rates of substance use during pregnancy.
Zhang 2021	Prevalence/incidence of risk factors	Urgent engagement in 9/11 pregnant widows and their infants: Transmission of trauma	73	United States	Mothers who were pregnant and widowed on 9/11/01	Not reported	Higher rates of anxiety and depression vs. healthy comparisons in mothers widowed during 9/11 while pregnant. Mothers who were widowed also exhibited increased effort to engage with their infants vs. healthy comparisons and were less tolerant of periods of less interaction or infant negative behavior during mother-infant observation.
Zheng 2021	Longitudinal cohort study	Attachment Security in Pregnancy Mediates the Association Between Maternal Childhood Maltreatment and Emotional and Behavioral Problems in Offspring	124	United States	Pregnant adults	Yes	Maternal childhood maltreatment severity was associated with less secure, and more avoidant and anxious attachment. Less secure maternal attachment mediated associations between maternal childhood maltreatment experiences and offspring emotional and behavioral problems.
Zink 2003	Cross sectional study	Violence and depressive symptoms during pregnancy: a primary care study in Brazil	712	Brazil	Pregnant adults	Yes	Domestic violence associated with unintended pregnancy and greater alcohol use during pregnancy.

and transitional age people,^{15,16,67,78,80,81,83,94} and 16 in adults of reproductive age.^{14,61-64,89,91,93,96,99-105}

Childhood maltreatment experiences and impaired internal working models: relationships with offspring and offspring outcomes. With respect to the impact of maternal exposure to interpersonal violence (including childhood maltreatment experiences +/- intimate partner violence), out of 29 relevant articles, 25 reported on early mother-child relational outcomes.¹⁰⁷⁻¹⁰⁹ Of these studies, 19 reported on mother-child attachment or relationship quality,^{14,105,110-125} 10 on maternal sensitivity or responsiveness,^{107,108,110,112,113,121,122,126-128} one on maternal reflective function,¹²⁸ one on maternal structuring,¹²⁹ four on maternal intrusiveness,^{110,119,126,128} one on parenting competence,¹³⁰ two on harsh parenting,^{110,119} two on negative infant emotionality,^{107,108} two on child internalizing symptoms,^{111,115} three on child externalizing symptoms,^{111,115,121} and one reporting on total child psychiatric symptoms.¹³¹ Overall, less optimal internal working models and severity of maternal mood or PTSD symptoms and alexithymia were associated with more negative parenting behaviors, lower reflective function, and negative offspring outcomes.^{105,110,112,113,119,122,126-128} Further, in families impacted by intimate partner violence, children had more insecure and less stable attachment styles and male offspring were more likely to exhibit aggressive touch.^{120,121,123,125} By contrast, more secure maternal adult attachment style was associated with better child outcomes across multiple studies.^{111,115,117} Further, though substance use was not assessed in this particular study, multiple separations or losses of caregivers were associated with less optimal offspring socioemotional development.¹¹⁴ Finally, maternal depressive symptoms worsened and more optimal parenting buffered against effects of childhood violence exposure.¹⁰⁷⁻¹⁰⁹

Perinatal substance use and impaired internal working models

As referenced previously, the relationship between impaired internal working models with substance use manifests in 2 major ways in the context of this review: (1) relationships with partners; (2) relationships with offspring.

Perinatal substance use and impaired internal working models: Relationships with partners. Much like childhood maltreatment experiences, exposure to intimate partner violence has been associated with increased risk for perinatal substance use, though the directional relationship is unclear. Of the 31 studies reporting relevant data^{67,68,70,76,79,96,132-156}, 29 demonstrated associations between exposure to intimate partner violence and substance use.^{67,68,70,76,79,96,132-154} Of these studies reporting higher co-occurrence of intimate partner violence with substance use, two longitudinal studies reported increased substance use in women following exposure to intimate

partner violence^{96,148}, four studies reported associations between intimate partner violence and partner substance use,¹⁴⁹⁻¹⁵² one study in young adults from 25 countries highlighted relationships between alcohol use and sexual assault,¹³² and another study noted racial/ethnic disparities, with African American and Hispanic but not White women exhibiting increased risk for substance use with intimate partner violence.¹³⁵ Other associated risk factors were noted in several studies, including unintended pregnancy, lower level of education, younger age, and history of military sexual trauma.^{138,142,145,146,153,154} These data regarding co-occurring risk factors are in line with the 19 studies reporting on early initiation of sexual intercourse (≤ 15 years old in most of these studies)^{81,83,101,132,146,147,157-160} and unintended pregnancy,^{83,133,138,146,150,153,161-164} all of which support relationships between these reproductive risks, intimate partner violence, and/or substance use.

Perinatal substance use and impaired internal working models: Relationships with offspring and offspring outcomes. Of the 54 articles pertinent to associations between impaired internal working models and early parent-child relationships and offspring outcomes,^{14,59,62,63,71,72,76,77,92,107-124,126-130,134,139,147,156,165-182} 28 reported on substance use,^{59,62,63,71,72,76,77,92,134,139,147,156,165-180} 8 studies excluded for substance use,^{110-113,126-128,130} and 18 did not report whether it was exclusionary or measured.^{14,107-109,114-124,129,181,182}

Of these 54 relevant articles, 41 addressed mother-infant or mother-toddler relationships,^{14,59,71,76,77,92,107,108,110-117,119-124,126-130,139,147,166-170,172,174,176-180} with 18 addressing substance use. Of these 18 articles, eight focused on cocaine +/- other drugs/alcohol,^{59,71,166,167,169,170,172,174} two focused on alcohol,^{178,179} three on opioids,^{92,176,177} and five focused either on cravings, multiple substances, or "illicit drugs."^{76,77,134,147,168} Approximately two-thirds of these pertinent studies addressed mother-infant relationships and one-third addressed mother-toddler relationships, reporting decreased maternal sensitivity,^{59,92,166,167,169,172,177,178} more neutral maternal affect,¹⁷⁸ lower structuring and higher intrusiveness,¹⁷⁰ more harsh parenting,^{170,179} higher maternal rigidity,¹⁷⁴ lower reflective function,⁷⁷ and high rates of parent-child separation.¹³⁴

Of the articles relevant to relational and child outcomes which reported on substance use, four addressed offspring outcomes,^{62,147,171,175} with two reporting on child socioemotional development,^{62,171} one reporting on child temperament,¹⁴⁷ and another reporting on child internalizing symptoms.¹⁷⁵ Given study heterogeneity and the low number of studies, it is difficult to make definitive conclusions, though one longitudinal study reported that prenatal substance use mediated the relationship between maternal childhood maltreatment experiences and young child internalizing symptoms.¹⁷⁵

Hyperkatifeia as a potential moderator

Perinatal substance use and childhood maltreatment experiences. With respect to hyperkatifeia as a potential moderator of the relationships between perinatal substance use and childhood maltreatment experiences, a total of 18 articles, including 6 with perinatal participants,^{67,69-72,76} 6 including adolescents,^{6,78-81,83} and 6 studies including females of reproductive age (not in perinatal or adolescent categories)^{8,59-63} supported this relationship. Findings in people exposed to early adverse experiences included earlier initiation of substance use (≤ 14 yo), “use to cope” in adolescents, increased rates of depression and suicidal ideation,⁸ higher rates of early sex or pregnancy,⁶⁷ depressive symptoms partially the moderating dose-response relationship between adverse early experiences and perinatal substance use in a longitudinal cohort,⁶⁹ the role of PTSD symptoms in the cycle of substance cravings, use, and withdrawal during pregnancy in 2 studies using ecological momentary assessment,^{70,76} interaction of interpersonal sensitivity and maternal stress with perinatal cocaine use,⁷¹ and associations of maternal early adversity, perinatal substance use, and depression with offspring internalizing and externalizing symptoms.⁷² Of note, these data included several population-based or longitudinal studies, with some noting even higher risk in females, which is particularly relevant for perinatal populations.^{78-81,83} Further, in two additional studies with higher-risk mother-toddler dyads (mothers using cocaine and mothers experiencing homelessness), adverse childhood experiences were associated with maternal depression, substance use, and lower sensitivity, which were, in turn, related to impaired toddler socioemotional development.^{59,62} Thus, the negatively valenced processes associated with hyperkatifeia may be transmitted to the next generation.

Childhood maltreatment experiences and internal working models of relationships. Seventeen of the studies addressing the relationship between childhood maltreatment experiences and internal working models had a relationship with hyperkatifeia-related phenomena.^{14,15,62,67,78,80,81,89,91,93,97-101,104,106} Seven studies reported on factors such as mood, anxiety, PTSD symptoms, or suicidal ideation/self-injurious behaviors^{67,78,81,96-98,106}, 10 reported a relationship with substance use^{62,67,78,80,81,89,91,93,96,97}, four studies reported associations with insecure adult attachment or disengaged coping strategies,^{14,99,100,106} while one negative study failed to link anxious attachment and increased risk for intimate partner violence.¹⁰¹

Perinatal substance use and internal working models of relationships. A relationship between perinatal substance use, suboptimal internal working models of relationships, and hyperkatifeia-related constructs was present in 12 articles,^{67,79,133,139,140,142,144,145,147,151,154,155} noting depressive symptoms,^{67,79,142,144,145} higher distress,^{140,155} perception of infants as dysregulated,¹⁴⁷ increased substance use after experiencing

reproductive coercion,¹³³ use of substances to cope,^{139,151} or mothers being unable to stop use during pregnancy.¹⁵⁴

Discussion

Hyperkatifeia during the perinatal period—the negative reinforcement cycle

To our knowledge, this is the first systematic review to examine the relationships of maternal childhood maltreatment experiences, internal working models of relationships, and perinatal substance use, with hyperkatifeia as a potential moderator, and to assess their collective impact on mother-infant relationships and offspring outcomes. As previously stated, hyperkatifeia is characterized by hypersensitivity to negative affect and dysregulation associated with not using substances—a key component of the negative reinforcement cycle of addiction.³⁹ Importantly, hyperkatifeia does not simply constitute withdrawal, but rather, relates to brain plasticity underpinning addiction, via which a new (lower) hedonic set point is established.⁴¹ Thus, even in the absence of acute withdrawal, associations between relief from negative affect and prior substance use constitute a powerful ongoing motivationally salient stimulus for continued use.^{183,184} Given this notion of addiction as both a reward deficit and stress surfeit problem, it is highly likely that both childhood maltreatment experiences and subsequent intimate partner violence further impact this process.³⁹⁻⁴² To the extent that these traumatic experiences pre-date substance use initiation, people may experience more brittle affect and emotional dysregulation at baseline.^{44,45} When substance use begins in adolescence, people using substances do not develop the coping skills to regulate their emotions without using substances.¹⁸⁵⁻¹⁸⁷ Thus, once the cycle of intoxication, withdrawal, and planning to obtain substances ensues, the person is “stuck,” attempting to cope with tonic negative affect and emotional dysregulation at baseline in the absence of use.³⁹

Hyperkatifeia, early adversity, and substance use—beyond trauma-related and depressive DSM diagnoses

These associations between trauma exposure, negative affect, and substance use are not a novel concept. In one of the first studies of Adverse Childhood Experiences (ACEs) from 2001, a relationship between suicide attempts and ACEs across the lifespan was partially mediated by 3 factors: depressive symptoms, illicit drug use, and ‘alcoholism’,⁸ with ACEs being similarly associated with substance use disorders in a parallel Canadian study.⁸⁸ Additionally, the current recommendations of the necessity to treat co-morbid conditions associated with negative affective tone (eg, depression and anxiety) simultaneously with substance use disorders underscores the importance of these relationships.¹⁸⁸⁻¹⁹¹

However, these phenomena go beyond the need to treat comorbid psychiatric disorders in people with problematic

substance use. This work is particularly relevant to the population of pregnant people who have experienced chronic trauma starting in childhood, and who use substances to cope with affective dysregulation, as childhood trauma has been identified as an important risk factor for hyperkatifeia in people using substances.^{39,192} Further, given the attachment disruptions in populations living with the sequelae of severe childhood abuse or neglect, associations between mothers' childhood maltreatment experiences and later exposure to intimate partner violence may compound affective dysregulation and negative mood at baseline in this population.^{44,193-199} Additionally, certain personality traits are independent risk factors for hyperkatifeia in people using substances, which may explain to some degree the more enduring nature of this problem, and which likely relates to the lack of development of healthy coping strategies during adolescence when use often begins.³⁹ Relationships between partner substance use, maternal substance use, and intimate partner violence even further worsen affective dysregulation in the setting of continued trauma.²⁰⁰ This relationship between suboptimal interpersonal relationships and emotional dysregulation is of particular importance during the perinatal period, as coping with changes in relationships and role function are critical during this time, and not surprisingly, one of the most supported interventions for preventing perinatal depression is interpersonal therapy.^{201,202} Thus, when substance use is involved in mothers who have experienced childhood trauma, risk is compounded—with the increased response to distress and emotional dysregulation at baseline which pre-dated onset of substance use,²⁰³ now overlaid with the addiction-related synaptic plasticity underlying hyperkatifeia.¹⁸³ These processes, in turn, relate to the pharmacological downregulation of brain reward function in response to substance use, exacerbating pre-existing trauma-related vulnerability.^{40,41,204} Further, these phenomena jeopardize relationships with infants, who are a “natural reward” for many parents.^{205,206} Importantly, although the detailed mechanisms are outside the scope of the current review, the mesolimbic dopaminergic pathway undergirds motivated maternal behaviors, interacts with oxytocinergic pathways, and the oxytocin system has previously been identified as a potential clinical intervention target for substance use disorders.²⁰⁷⁻²⁰⁹

Implications of perinatal substance use for mother-infant relationships

In considering relationships between substance use and maternal behaviors, there are several points which should be highlighted. First, several studies suggested that ongoing postnatal substance use versus exclusively prenatal use contributed to lower levels of mother-infant reciprocity^{166,170,174,176}; thus, while many have emphasized the primacy of prenatal exposure, the postnatal period is also crucial for mother-infant relationship development. Additionally, in a study of mothers on

medication-assisted treatment, whether mothers responded contingently to infants explained more variance in mother-infant relationships than substance use.¹⁷⁷ One study found not as many differences between mothers using substances compared to other high-risk samples (eg, —mothers with lower income),⁹² suggesting that social determinants of health, including structural racism, should receive consideration, which is in line with previous studies.^{155,210,211} Lastly, the impact of the separation/loss of caregivers on offspring socioemotional development cannot be overstated.¹¹⁴ With the share of US children entering foster care due to parental substance use increasing from 15% in 2000 to 36% in 2017,²¹² these data collectively underscore three relevant points: (1) attachment relationships are disrupted by separation of parents and children as well as substance use itself; (2) integrated services to address mother-infant relationships, maternal substance use, and co-morbid mental health conditions are often unavailable; and (3) stigma is enormous for mothers with substance use as they seek care. The inordinate focus on prenatal substance use may drive separations of families and decrease mothers' propensity to seek treatment for their substance use, resulting in a missed opportunity to modify mother-infant relationships in the postpartum period with appropriate and integrated treatment.

Developmental approaches for early intervention, prevention, and perinatal substance use treatment

The roles of early life caregiving, adversity, and sources of resilience are critical to consider, as they affect the relationships between mothers' experiences of childhood maltreatment, less optimal internal working models of interpersonal relationships, and perinatal substance use. Childhood traumatic experiences and negative internal working models of relationships have reverberating effects across the lifespan for interpersonal relationships and health behaviors.^{213,214} Although assessing the teratogenic outcomes of prenatal substance use exposure was outside the scope of this review, it has been shown to increase risk for substance use in the subsequent generation.²¹⁵⁻²¹⁸ Additionally, during adolescence, the life course of potential mothers is profoundly affected by early sexual initiation, substance use, peer interactions, and choice of romantic partners.^{219,220} Collectively, these adolescent developmental processes alter the balance between mothers' vulnerability and resilience, impacting the perinatal period, whether or not people become parents during adolescence. When we consider the discourse in the literature surrounding “deaths of despair,²²¹” which occur across multiple racial and ethnic groups during midlife,^{222,223} the antecedents clearly do not start in midlife. Importantly, investigators have reported changes in infant and adolescent health during the opioid crisis.^{224,225} Further, social determinants of health and their impact upon young families cannot be ignored, including housing availability,²²⁶ the impact

of discrimination and structural racism on perinatal and young child health,²²⁷⁻²²⁹ less supportive social policies for young families in the US (eg, —decreasing access to contraception and lack of paid family leave),²³⁰ as well as inequalities based on race, ethnicity, and socioeconomic status in reporting of putative neglect for maternal substance use in the US.²³¹

The perinatal period represents an important time in life where women expecting a child may seek to improve their life circumstances and health habits including reducing substance use, although women with undertreated and more severe mental health symptoms are less likely to do so.²³² Lifecourse events including traumatic experiences such as intimate partner violence and exposure to structural racism, demographics, social determinants of health, and type of substance used influence mothers' ability to reduce their use or to engage in treatment during the perinatal period.^{24,144,151,154,156} To the extent that substance use, maternal exposure to early adversity, and attachment vulnerabilities interact, in substance use treatment, providers should consider not only co-morbid mental health conditions, but also the interaction of trauma exposure, relational problems, and substance use in women during the perinatal period.

Limitations

Many articles either did not report on substance use or excluded people using substances. This is problematic due to the importance of considering substance use and trauma together since co-exposure is highly likely. Furthermore, the lack of inclusion of substance use measures may be at least partially due to the way that perinatal substance use is treated clinically in terms of reporting to child protective services, which is often not linked to immediate referral to high-quality substance use treatment. While exposure to substances is an important risk, the way that cannabis and other illegal substances are treated is largely different than alcohol. Additionally, there are known disparities in reporting to child protective services based on race, ethnicity, and socioeconomic status. All these factors may influence both research groups and participants as they decide whether to either include substance measures in projects or whether for participants, they will take part in research. This issue likely worsens both health disparities as well as disparities in research participation. In addition, since most parent-child perinatal work has been conducted in *cis*-gender heterosexual females, when referring to differences based on sex in pregnant or postpartum people, the words “females,” “women,” or “mothers” were used in this study. Many articles confounded sex and gender, as many did not collect data on gender identity. There is limited literature on people identifying as fathers and extremely sparse literature on LGBTQ+ parents. Expanding the research framework and parental populations studied is of critical importance for understanding these phenomena in families of all compositions, including addressing differences related to

biological sex (based on chromosomal status), sexual orientation, and gender identity in future research. Additionally, only 63% of the articles included in this review which addressed offspring outcomes considered sex differences in these outcomes. Race and ethnicity were reported in only 71% of articles. In the remaining 29% either no breakdown was provided, nationality alone was provided, or investigators reported dichotomously (White/Caucasian vs not White/Caucasian). Given migration, health inequities, increasing heterogeneity of populations, and the importance of understanding the impact of structural racism on mother-infant dyads, more consistent reporting methodology would be beneficial. Despite well-known limitations associated with retrospective reporting of childhood maltreatment experiences²³³⁻²³⁵ and lack of assessment of the impact of developmental timing and heterogeneity of adverse early experiences,^{236,237} many papers included in this review used longitudinal cohorts, which helped to mitigate this problem. The quality of any review depends on the quality of the underlying studies, which had considerable limitations, particularly in some of the dichotomous measures of substance use, lower frequency of articles considering gold standard measures of use patterns (ie, —timeline followback), and very low inclusion of biological measures of substance use.

Gaps in literature and future directions

Although many investigators study the impact of early adversity and substance use, it is important to account for each of these factors when considering the other, as both affect maternal and child health. In our review 29% of articles considered trauma alone (ie, —including childhood maltreatment +/- intimate partner violence exposure), 24% of articles considered maternal substance use alone, while only 47% addressed both phenomena. Given the impact of perinatal substance exposures and the relationship between maternal mental health and less optimal mother-infant relationships (even in studies where substance use was an exclusion criterion), it is critical that more in-depth perinatal studies of mothers and their offspring are performed for understanding the important impact of these phenomena on two generations. Further, studying the dynamic between one of the more potent natural rewards (babies) and hyperkatifeia in mothers during the perinatal period, may lead to treatment innovations, with goals of treating maternal substance use, decreasing parent-child separations, and improving mother-infant outcomes.

Author Contributions

Conceptualization: AKO, PR, KH, NT, CZ, CNE; Data curation: AKO, IC, DA, HC, BB, LS, KK; Formal analysis: AKO; Methodology: AKO, CNE Interpretation of data: AKO, IC, DA, HC, BB, LS, KK, KH, CZ, NT, PR, CNE; Writing—original draft: AKO; Writing—review and editing: AKO, IC, DA, HC, BB, LS, KK, KH, CZ, NT, PR, CNE.

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