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**Parenting behaviors in the context of Substance Use Disorder:
Implications of psychopathological and cognitive factors for
assessment and intervention**

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Summary

The current thesis focuses on quality of parenting behaviors in the context of maternal Substance Use Disorder (SUD), considering the psychopathological and cognitive mechanisms involved, and identifying a possible intervention protocol that could consider these aspects.

The first part of the work will provide a general overview of parenting, considering some of the mechanisms involved in the process of taking care in early infancy and childhood. In chapter 1 we will discuss the role of parenting behaviors in shaping child development, identifying how their quality can be influenced by the cognitive resources of the parent or the presence of psychopathological symptoms in the adult.

The second part of the work will focus specifically on parenting in the context of SUD, a high-risk condition for quality of care and for child development. In Chapter 2 we will present an empirical study aimed at investigating quality of parenting behaviors through cluster analysis in mothers with SUD. In chapter 3 we will discuss the results of a study aimed at examining the role of maternal alexithymia, a specific type of psychopathology, on quality of parenting behaviors in mothers with SUD. In the empirical study in Chapter 4 we will report on a longitudinal study investigating the effect of parental psychological symptoms and executive functioning on the development of parent-child relationships during a residential program for drug addiction. In chapter 5 we will present a proposal for a randomized controlled trial aimed at modifying quality of parenting behaviors in mothers with SUD considering the intervening role of cognitive and psychopathological mechanisms.

Finally, in the last section we will provide a general discussion of the topics developed through the work, highlighting some methodological challenges and some empirical and clinical implications based on the results of our empirical studies.

Chapter1

General introduction

Abstract

In this first chapter we provide a general overview of parenting, considering some of the mechanisms involved in the process of taking care in early infancy and childhood. Firstly, we introduce the construct of parenting, focusing on its evolutionary, emotional, and social objectives. Secondly, we examine more in detail quality of parenting behaviors which represent a direct measure of quality of care in infancy and an index of the child's actual experience of care. Following we discuss how individual differences might shape quality of parenting behaviors, considering the role of adult psychopathology and cognitive functioning. Finally, we introduce the context of parental Substance Use Disorder, highlighting the usefulness of further investigating the interaction between behavioral, psychopathological, and cognitive dynamics in this clinical population.

Parenting

Parenting refers to the possibility to take care of an individual which is younger or more vulnerable (Simonelli, 2014), requiring to be sensitive, emotionally attuned, and responsive to their needs (Ainsworth et al., 1978; Bowlby, 1969). This ability relies on a complex network of behavioral, emotional, cognitive, and neurophysiological processes that interact together and mutually influence each other (Bornstein et al., 2018; Deater-Deckard & Sturge-Apple, 2017; Feldman, 2016; Swain & Ho, 2017). To provide appropriate parenting, caregivers need to adapt this ability to different developmental stages and situations, both to cues linked to instrumental (e.g. hunger, tiredness) or emotional (happiness, sadness, fear or more complex emotions) care. This ability can be jeopardized by several conditions, including parental Substance Use Disorder (SUD) which has been widely associated to differential reactivity to infant cues (Rutherford et al., 2021), poor quality of care (Flykt et al., 2012; Pajulo et al., 2012; Salo et al., 2009b), and less optimal developmental pathways in offspring (Mansoor et al., 2012; Bandstra et al., 2010). Given the potential harmful effects of poor caregiving on child growth and wellbeing, the investigation of parenting in this clinical condition represents a critical research topic, with important implications in terms of assessment and intervention. Moreover, considered the impact of substance misuse on different domains of individual and relational functioning, it is important to further understand how parental SUD could affect the different behavioral, cognitive and psychological mechanisms involved in parenting. To properly address these research questions, which will be addressed during the following chapters, the present chapter provides a concise overview of the normative characterization of parenting, considering the importance of parenting behaviors and introducing the cognitive and psychological mechanisms that could support or weaken its quality.

All over the world, parents are enormously invested in children's survival, socialization, and education (Bornstein, 2002). Especially at a young age, human infants are completely dependent on

adults for survival. For this reason, parental responsibilities towards their offspring's wellbeing are higher during early infancy, when children are most dependent on their caregiving figures and they do not have abilities to cope alone (Bornstein, 2002; Bowlby, 1982).

Thus, early infancy is the phase of the life cycle when adult caregiving is both most intense and exerts significant influence on children (Bornstein, 2002). Immediately after birth, parents begin to intuitively enact a series of species-typical set of caregiving behaviors that include affectionate touch, gaze at infant's face, baby-talk vocalizations, and positive affect, which are adapted to the rhythm of the newborn alertness and provide the first experience of a contingent interpersonal exchange (Feldman, 2012; Papoušek, 2007). Research highlights that parents of infants spend more time engaging in childcare practices with respect to caregivers of older children (Drago, 2009). Indeed, the shared amount of interaction between parent and child is greater in infancy with respect to later stages of development (Hill & Stafford, 1980).

The first social exchanges take the form of face-to-face interactions where every partner participates in a moment-to-moment interactive regulation process at the nonverbal level, where the behaviors of one partner (e.g. rhythm, facial expression, or vocal intonation) can be predicted from that of the other partner and vice versa (Beebe, 2006; Beebe & Lachmann, 2002; Tronick, 1989). Later, parent-child relationships become increasingly complex, and parental responsibilities gradually adapt to their offspring's growing autonomy (Green et al., 1980).

From an ethological perspective, parenting infants offers protection from dangers and predators and favors survival (Bowlby, 1969; Glocker et al., 2009; Lorenz, 1943a). The possibility of remaining close to an easily accessible familiar individual and their willingness to take care and aid in case of emergency is of survival value (Bowlby, 1982).

Parental sensitivity and preference for infant cues rely on complex networks of key brain circuits and neurohormones that critically shape parental responses to infant cues (Swain, 2011; Swain et al., 2004). Human adults are neurobiologically predisposed to preferentially respond to infant salient stimuli, as faces or cries, which serve as "releasers" or "key stimuli" that motivate

caretaking behaviors (Lorenz, 1943a, 1971). These mechanisms gradually change during the transition to parenthood to set the basis for later parent-infant attachment (Gordon et al., 2017). During pregnancy, for example, future mothers experience a series of hormonal changes, especially prolactin and oxytocin that further strengthen the predisposition to infant stimuli and the motivation to take care (Alcaro et al., 2007; Feldman, 2012; Panksepp, 2009). The characteristics of these physiological adjustments are predictive of post-partum parenting behaviors and of the ability to coordinate with infants' state (Feldman & Eidelman, 2007). In a species whose offspring largely rely upon adult care, such biases and predispositions are adaptive from an evolutionary point of view and enhance offspring survival (Bowlby, 1969).

Moreover, early childhood is a period of rapid development in almost all domains of human functioning (Bornstein, 2002). Newborns and infants are characterized by great plasticity, and their developing brain is sensitive to a wide range of factors that modulate its development beginning with parents' preconception experiences, gestational and postnatal experiences (Kolb et al., 2017). Different studies point out that infants exposed to high maternal gestational stress are at risk of mild impairment in different developmental domains (Brouwers et al., 2001) and more likely to exhibit emotional or behavioral disorders later in development (Kofman, 2002; Weinstock, 2001, 2008).

At the same time, infants are reciprocally sensitive to the quality of their parents' characteristics and caregiving practices. Already during pregnancy, oscillator systems in the fetus reach a progressive consolidation, laying the fundamentals for subsequent engagement in social contingencies (Feldman, 2012; Groome et al., 1999; Mirmiran & Lunshof, 1996). During gestation, a preference for maternal voice is already observable, with specific fetal adjustments that include cardiac, motor, and brain responses (Carvalho et al., 2019). From the very short period after delivery they appear to recognize and prefer sights, sounds and smells of their caregivers (Carvalho et al., 2018; Schaal et al., 1998), and over the course of the first two years of life they develop structured attachment bonds to them (Ainsworth et al., 1978).

The evolutionary and continuous task of parents is to prepare their children for the psychosocial, physical, and economical situations that they are going to face during their development (Bornstein, 2002; LeVine, 1988). This task is cross-cultural and everywhere parents are highly motivated to achieve it (Bornstein, 2012). Indeed, despite culture-related differences, parents are inclined to provide their offspring with experiences that scaffold them to become culturally competent members of their society (Bornstein, 2012).

Quality of parenting shape children's experience and is central to their immediate and long-term development (Bornstein, 2002). Appropriate care enhances children's social, emotional and cognitive development (Kok et al., 2013; Newton et al., 2014).

The characteristics acquired since from the first phases of extrauterine life, constitute building blocks of experience that later developmental stages or environmental experiences modify (Bornstein, 2002). The quality of the experience of interactive synchrony during the first months of life modulates the functioning of behavioral, physiological, and hormonal systems that will guide the provision of parenting to the next generation, contributing to the intergenerational transmission of attachment patterns (Feldman et al., 2010). Parent-child synchrony refers to the process by which parent and child progressively coordinate together through the building of their affiliative bond, and involves an extended network of physiological, hormonal, and behavioral mechanisms that are mutually coordinated during social interactions (Feldman, 2012). When things are optimal, parents and infants activities are characterized by complex patterns of synchronous interactions and sensitive mutual understanding (Bornstein, 2002). The repeated experience of the mutual coordination between physiological states and interactive behaviors within each partner sets the basis for affiliative bonds, whose characteristics guide child's socio-emotional growth, influencing the ability to regulate stress and modulate arousal, as well the capacity to engage in social interactions (Feldman, 2016). The experience of care set the basis of the ability to take care, and children who experience appropriate parenting are more likely to become adults able to provide appropriate nurturance (Feldman et al., 2010).

Parenting quality and the ability to coordinate with the infant state are disrupted in conditions involving physical or emotional difficulties in the parent or in the child, as for example parental psychopathology or child premature birth (Feldman et al., 2002; Feldman & Eidelman, 2007). These conditions might affect sensitivity to infant cues as well the readability of infant signals, constituting a risk factor for the consolidation of functional parent-child relationships that requires appropriate identification and treatment.

Thus, parenting is guided through a complex network where neurobiological, emotional, cognitive, and behavioral factors, both in the adult or in the child, influence each other. These aspects interact with each other influencing quality of care, and subsequently affecting child development. The next paragraphs will afford more in-depth parenting behaviors, the role of cognitive mechanisms involved in parenting, and the effect of parental psychopathology on quality of care.

Parenting behaviors as a measure of quality of care

Parenting behaviors enacted during everyday caregiver-child interactions represent one of the most direct expression of parenting (Bornstein, 2002a). The term parenting behaviors refer to a wide range of verbal and nonverbal demeanors (e.g. looking, smiling, talking, cuddling, holding) that adults perform when communicating and engaging with their children during the diverse task of care, as lay, bathing, feeding, and limit-setting. On different occasions, parenting behaviors are connoted by a specific emotional tone, which contributes to determine their quality (Biringen & Robinson, 1991; Sorce & Emde, 1981). Appropriate parental responses are contingent, coherent, and emotionally attuned to the child's communications and cues (Ainsworth et al., 1978; Saunders et al., 2015; Sorce & Emde, 1981). Parental behavioral responses provide a direct index of the adult's ability to be sensitive to the child's cues. On the other hand, they offer a measure of quality of parent-child relationships and of the child's actual experience of care (Beebe & Lachmann, 1998; Bowlby, 1969).

When children experience emotional and physical availability, as well as responsiveness from their caregivers, they are provided with a feeling of security and encouraged to value and continue those relationships (Bowlby, 1982).

While in most primates parenting behaviors largely focus on the satisfaction of basic physiological needs as feeding, grooming, and protection, parent-offspring interactions in humans are more dynamic and varied (van IJzendoorn et al., 2009). Specifically, apart from nurturing and instrumental caregiving, which is prerequisite of infants' survival, human parents also provide social, didactic, and material caregiving, engaging their children in interpersonal exchanges through a variety of affective, verbal, visual and physical behaviors, organizing their physical world and guiding them in the understanding of the surrounding environment, (Bornstein, 2002).

At a group level, parenting behaviors vary considerably across adults, even though they belong to the same culture or socio-economic group (Bornstein, 2002). At the individual level, parenting practices tend to remain consistent during daily activities and change over time according to the progression of the different developmental milestones reached by children (Bornstein, 2002; Marc Bornstein et al., 2008). When things are good enough, parenting abilities vary in time to adjust to the child's developmental stages, according to their age and performance (Adamson & Bakeman, 1984; Bellinger, 1980; Bornstein et al., 2008), and to the different touchpoints that require a re-negotiation of family dynamics (Brazelton, 1999). At the same time, despite being consistent in their modality of enactment, different domains of parenting behaviors are relatively independent from one another, representing coherent but distinctive constructs (Bornstein, 2002). Throughout the literature, several constructs have been developed to operationalize the different domains of parenting behaviors and to assess their quality (Biringen & Robinson, 1991; Bornstein, 2002; Mesman & Emmen, 2013). Within Attachment theory, Mary Ainsworth and her colleagues (Ainsworth et al., 1974) developed the Maternal Care Scales, a group of scales aimed at assessing a great variety of parenting behaviors (De Wolff & van IJzendoorn, 1997; Mesman & Emmen, 2013), including sensitivity-insensitivity to infant signals, cooperation-interference with infant's ongoing activities, acceptance-rejection, and

accessibility-ignoring (Ainsworth et al., 1971). In their work, particular attention was dedicated to parental sensitivity, defined as the parent's ability to perceive child signals, interpret them correctly, and respond to them promptly and appropriately, which was identified by the authors as the most important feature associated to infant attachment security (Ainsworth et al., 1978). Similarly, drawing from the construct of maternal sensitivity and from assumptions emerging from theories of affective attunement (Mahler et al., 1975; Sorce & Emde, 1981) and transactional theories (Sameroff, 1975), Biringen and colleagues (Biringen & Robinson, 1991) developed the Emotional Availability Scales (Biringen, 2008; Biringen & Robinson, 1991) aimed at measuring emotional availability, conceptualized as the capacity of a dyad to share an emotional connection and to enjoy a mutual fulfilling and healthy relationship (Biringen & Easterbrooks, 2012). This second approach gives more emphasis to the role of positive affect and warmth in the assessment of parenting, considering both the parent and the child's contribution to the relationship (Biringen, 2008; Biringen et al., 2014; Biringen & Easterbrooks, 2012). From this perspective, parenting behaviors are declined in the domains of sensitivity, structuring, nonintrusiveness, and nonhostility, whereas two other scales measure the child's responsiveness to and involvement of the caregiver. Both these perspectives, which present differences and partial overlap in their definition of proper care (Bretherton, 2013; Mesman & Emmen, 2013; Pederson et al., 2014), represent important contributions to the operationalization of parenting behaviors, and suggest that caregivers who are emotionally attuned, and who accurately perceive their children's signals and respond to them promptly, reliably, and appropriately, provide their offspring an experience of comprehension and readiness, which provide them that they can trust in their parents to be there for them, enhancing their sense of control and self (Bigelow et al., 2010; Bornstein, 2002). Parenting behaviors which are sensitive and emotionally available promote the development of secure attachments in children and are associated to positive socio-emotional developmental outcomes (van Der Voort et al., 2014). On the other hand, parenting behaviors that are non-responsive and lack of emotional and physical accessibility provide children experiences of care which are painful and frustrating (Belsky et al., 2007; Bornstein, 2002).

Uncertainty about parental responsiveness is linked to apprehension and to the possibility to get more easily upset during stressful situations (Rubin et al., 2003). Parental insensitive behaviors are important risk factors for the development of insecure and disorganized attachments (Lyons-Ruth et al., 2003, 2013) and for later child maladjustment (Fearon et al., 2010).

Sensitivity to infant signals has been found to be transversal to different cultures (Bornstein et al., 1992; Posada et al., 2016). Specifically, sensitivity to infant distress are similar in different cultures, given that distress is a key stimulus for eliciting proximity and care, whereas other aspects vary according to divergent cultural goals of parenting (Bornstein et al., 1992).

Parenting behaviors affect child development through different paths. Parents can influence their children directly, through genes, beliefs and behaviors, as well as indirectly influencing one another and the multiple contexts in which they live (Belsky et al., 2015; Bornstein, 2002; van Der Voort et al., 2014; Windhorst et al., 2015).

On the other hand, there is a transactional influence between parenting behaviors and child development (Sameroff & Haith, 1996; Arnold Sameroff, 1975). Each infant specifically interpret the experiences they are exposed to and how these same experiences will affect them (Scarr & McCartney, 1983; Trevarthen, 2017). Moreover, offspring influence the experiences they will be exposed to though their specific characteristics (Bornstein, 2002). Already during gestation, fetuses influence their parents' experience through their movement, affecting the development of maternal-fetal attachment (Güney & Uçar, 2019). After delivery, newborns present a series of unique traits, as temperament, emotional expressiveness, perceptual awareness, and cognitive status, that guide their parents' practices (Bornstein, 2002; Putnam et al., 2002). For example, infant frustration, fearfulness, and effortful control elicit specific parenting behaviors that predict increases in these same features (Kiff et al., 2011; Paulussen-Hoogeboom et al., 2007). These features partly rely on structural characteristics, as the development of autonomic maturity (Feldman & Eidelman, 2007), and determine responsiveness to external stimulation, readability of behavioral signals, and predictability of child behaviors, which specifically affect parental responses and the development of parent-infant

synchrony (Goldberg, 1977). In this sense, in each parent-child relationship, the characteristics of the infant and quality of parenting behaviors operate together affecting one another (Seifer et al., 1996).

Given their importance, parenting behaviors represent a key element to assess quality of parenting, as well one of the main targets of intervention in all those cases where parent-child relationships present difficulties or are at risk due to individual, relational, or environmental conditions (Bakermans-Kranenburg et al., 2003).

The role of adult psychopathological aspects in parenting

Adult mental health, intended as a state of well-being in which individuals realize their own abilities and can fruitfully cope with the normal stresses of life, represents an important aspect supporting the provision of adequate parenting (Engle, 2009). An extensive body of literature indicates that symptoms of psychopathology in parents negatively affect family relationships and quality of parent-child interactions, jeopardizing quality of care and offspring developmental outcomes (Zahn-Waxler et al., 2002). As we will see in Chapter 3, this aspect becomes particularly critical in the context of SUD, where psychopathological symptoms not related to substances interact with symptoms subsequent to drug assumption and abstinence. Apart from this specific condition, the presence of psychopathological symptoms in parents has been widely associated with poor parenting quality and increased rates of psychological disturbances in children (Stein & Harold, 2015). Specifically, parental psychopathology would act as an early risk factor that sets the path for a cascade of processes that enhance the risk of disrupted caregiving and child psychopathology during later development (Ramchandani & Stein, 2003; Stein & Harold, 2015). In the presence of psychopathology, the efforts of caregivers to meet their own intensified needs, as for example the regulation of arousal, anxiety, and the management of flat mood, interfere with the possibility to attune to the infant's needs, subsequently compromising the possibility to respond to them in a sensitive and affectively warm manner (Berg-Nielsen et al., 2000; Zahn-Waxler et al., 2002). The reduction of parental psychological

and emotional resources leads to perceive the child's signals and requests as more stressful and burdensome, subsequently affecting parental responses (Zahn-Waxler et al., 2002). In this sense, the literature highlights that parenting behaviors are more likely to present less functional features in the context of adult psychopathology (Cohn et al., 1990; Stevenson-Hinde et al., 2013). As a consequence, parental negative or non-optimal responses could further lead to difficult child's behaviors following unmet infant needs, which could ignite an escalation of negative transactions which become increasingly difficult to manage for the parent (Zahn-Waxler et al., 2002).

Some disorders are particularly common in child-bearing years, as depression, anxiety, and substance misuse (Ramchandani & Stein, 2003; Stein & Harold, 2015).

Depression is included in mood disorders, which are characterized by mood dysregulation in the form of prolonged sadness, inability to experience pleasure, irritability, or maniacal states, as well by a series of neurovegetative symptoms (APA, 2013). A large body of literature highlight that parental depression can negatively impact offspring development and emotional wellbeing (Cummings & Davies, 1994). Severe parental depression is associated with an increased risk of behavioral problems in school-aged children and an increased risk for psychiatric disorders in adolescence (Tully et al., 2008; Goodman et al., 2011; Harold et al., 2011). Episodes of depression occurring in the postnatal period are around 13% (O'hara & Swain, 1996). Offspring of depressed parents are at higher risk for developing disorders related to depression, anxiety, and substance misuse (Weissman et al., 2006). Moreover, children of depressed parents are at increased risk for experiencing social impairments (Weissman et al., 2006) and lower performances on different developmental dimensions (Murray et al., 2010; A. Stein et al., 2008). Moreover, infants of depressed parents are more inclined to develop insecure attachments to their caregivers, especially avoidant and disorganized ones (Martins & Gaffan, 2000), as well as quality of parenting is an important mediator of the effects of depression on young children (Leve et al., 2009). Depressed mothers perceive their parent role as more difficult than non-depressed mothers (Weissman et al., 1972). Observational studies highlighted several parenting difficulties among depressed parents including higher rates of

negative interactions, increased hostility (Goodman & Brumley, 1990), and impatient use of directives in guiding child behavior (Forehand et al., 1986). In other studies depressed mothers have been found to be less responsive to child cues, to communicate less effectively, to have lower synchrony with their infants, and to experience less positive interactions with them (Cohn et al., 1990; Goodman & Brumley, 1990). Research on emotional availability highlighted that the experience of chronic maternal depression is related to lower levels of maternal sensitivity, and this association is mediated by the adults' impaired capacity to take their child's perspective (Trapolini et al., 2008).

Depressive symptoms are comorbid with symptoms referring to other psychiatric disorders, as anxiety disorders, and personality disorders (Zahn-Waxler et al., 2002). Specifically, dysfunctional personality traits have been associated to greater severity of psychological distress in patients with mood disorder (DeMulder et al., 1995; Hong & Tan, 2021). Moreover, parenting of individuals with mood symptoms might be continuously problematic despite the episodic nature of mood disorders, given that mood-related impairments do not necessarily disappear between episodes (Ashman et al., 2002).

Anxiety disorders represent the other prevalent form of adult mental illness and exert an impact on parenting and child wellbeing (Zahn-Waxler et al., 2002). Children of parents with anxiety present increased risk for experiencing anxiety disturbances (Biederman et al., 2006; Turner et al., 1987)). Prenatal anxiety has been associated to offspring emotional and behavioral problems (Glover, 2011), whereas postnatal anxiety was linked both to emotional and somatic problems (Glasheen et al., 2009; Murray et al., 2009). High levels of maternal anxiety are associated to behavioral inhibition and anxious-ambivalent attachment in children (Stevenson-Hinde et al., 2013).

The intergenerational transmission of anxiety is hypothesized to occur in part through quality of parenting. Maternal cognitions associated to depression and anxiety, as rumination and worry, as well as the other risk factors associated to these clinical conditions, prevent a correct perception of the child's signals, subsequently impacting quality of parenting behaviors and of parent-child interactions (Stein, 2012). Following birth, high levels of maternal anxious symptoms are associated

to non-optimal parenting behaviors such as reduced sensitivity to infant signals, lower emotional tone (Nicol-Harper et al., 2007) and over-control (Whaley et al., 1999). At the same time, other studies indicate that, compared to controls, more anxious mothers tend to show exaggerated behaviors with their infant during free play and teaching interactions, suggesting that different forms of non-attuned parenting behaviors are likely to occur in the presence of maternal anxious symptoms (Kaitz et al., 2010). Anxiety symptoms can be transmitted from parent to child through modelling of anxious behavior (Murray et al., 2009), and through parental cognitions which would exert an adverse effect on their responsiveness, subsequently impacting children's behaviors and cognitions (Murray et al., 2009; Stein, 2012). Moreover, some studies provided evidence for a different activation of autonomic parasympathetic arousal in children with anxiety disorders (Blom et al., 2010; Monk et al., 2001). Thus, a combination of genetic and individual vulnerabilities and dysfunctional parenting behaviors increase the risk of developing an anxiety disorder in children (Murray et al., 2009).

Although less frequent, psychotic disorders represent a severe condition for parenting, characterized by symptoms that affect thoughts, perceptions, language, communication, emotions and behaviors (APA, 2013). The role of hereditary factors in psychotic disorders has been well documented, with children of psychotic parents being at higher risk to develop psychotic symptoms (Bergman & Walker, 1995; Fowles, 1992; Zavos et al., 2014), although a role of environmental factors was also evidenced (Schlosser et al., 2010; Stabenau & Pollin, 1993). Psychotic symptoms in parents are likely to adversely affect a series of neurodevelopmental, physical, socio-emotional, and cognitive outcomes in infants (Stein & Harold, 2015; Zahn-Waxler et al., 2002). Offspring of psychotic parents tend to exhibit reduced physiological arousal (Schubert et al., 1996) as well as brain abnormalities that involve both cortical and subcortical areas (Cannon et al., 1993, 1994). Later on, they are more inclined to present developmental delay and cognitive difficulties (Goodman & Brumley, 1990; Yoshida et al., 1999), signs of maladjustment (Abbott et al., 2004; Skagerlind et al., 1996), as well as behavioral problems (Silverton, 1988). On the other hand, children of psychotic

parents tend to show more avoidance during interactions with them (Riordan et al., 1999; Simonelli et al., 2014) and higher rates of insecure attachments (Näslund et al., 1984).

As far as it concerns parenting, mothers with psychotic disorders tend to show less emotional availability towards their children, being less involved and responsive during interactions with them and tending to exhibit higher negative affect and less positive emotions during interactions (Goodman & Brumley, 1990; Simonelli et al., 2014). During daily exchanges, they tend to provide little sensory and motor stimulation (Riordan et al., 1999), as well as less nurturance and environmental stability compared to low-risk mothers (Dolman et al., 2013; Ragins et al., 1975). Quality of parenting behaviors is correlated with severity of psychopathological symptoms, with mothers exhibiting a higher level of positive symptoms presenting less responsiveness, stimulation, and positive affect during interactions with their children (Snellen et al., 1999). In the long run, children of parents with psychotic disturbances are required to cope with dramatic variations in parental mood and behaviors, sometimes having to provide care for their caregivers (Stein & Harold, 2015).

Psychotic and mood symptoms are at times overlapping, given that psychotic characteristics can manifest also in severe cases of mood disorders and that negative and positive symptoms of psychosis may affect mood as well (APA, 2013; Romm et al., 2010). Some studies, comparing mothers with psychotic disorders to mothers with mood symptoms, with the first group presenting higher difficulties (Riordan et al., 1999). On the other hand, other studies identified small or no differences between the two groups (Goodman & Brumley, 1990). In these studies, severity of quality of parenting, rather than a specific diagnosis, was related to poorer child cognitive and social development (Goodman & Brumley, 1990).

The role of parental psychopathology on offspring's development is explainable through a variety of genetic, biological, and environmental factors that act singularly or in combination to shape children's developmental trajectories (Ramchandani & Stein, 2003; Stein & Harold, 2015; Zahn-Waxler et al., 2002). The transmission mechanisms responsible for this process vary depending on the particular psychopathological symptoms considered (Stein & Harold, 2015). Some authors

suggest that, rather than the specific disorder per se, the severity of the disturbance would play a key role in damaging quality of parenting, preventing the adult to adequately recognize, interpret, and respond to the child's signals and needs (Rogosch et al., 1992). Emerging evidence suggests that the intergenerational transmission of psychopathology is not phenotype specific, but rather a given psychiatric risk in the parent could convey one or more risks in children (Stein & Harold, 2015). Furthermore, different studies highlight the need to consider more "aspecific" indexes of psychological maladjustment (e.g. alexithymia, emotion dysregulation) that, although not representing a clinical diagnosis per se, could represent symptoms of diminished mental health in individuals and transdiagnostic risk factors for the development of more structured clinical conditions (Preece et al., 2022; Taylor & Bagby, 2000). Globally, the timing, the severity, and the duration of parental psychopathological symptoms could have different implications on offspring wellbeing, according to age and specific developmental milestones to be reached (Goodman & Gotlib, 1999; Weissman et al., 1972). In all those cases, quality of parenting behaviors is identified as an important mediating variable for the intergenerational transmission of psychopathology, suggesting that diminished warm and sensitive responses to child signals, subsequent to the emergence of psychopathological symptoms, are more likely to enhance the development of maladaptive characteristics in offspring (Stein et al., 2009; Stein & Harold, 2015). Additionally, psychiatric disorders often impact cognitive functioning, leading to decreased attention, working memory, as well to disruptions in language and social cognition (Millan et al., 2012; Tuulio-Henriksson et al., 2011), which, as highlighted following, are important elements for appropriate parenting (Deater-Deckard et al., 2010; Deater-Deckard & Bell, 2017).

Finally, when considering the effects of parental psychopathology, it has to be kept in mind that, often, psychiatric epidemiology is associated to other adverse variables, as for example low socioeconomic status (Johnson et al., 1999), couple maladjustment (Downey & Coyne, 1990), or social isolation (Boyce, 2003).

The role of adult cognitive mechanisms for adequate parenting

Parental cognitive functioning could play an important role in supporting parental practices and in shaping the quality of parenting behaviors (Deater-Deckard et al., 2012). In order to provide appropriate care, parents should be able to take their children's perspective and to consider the different mental states (e.g. feelings, wishes and desires) motivating their observable behaviors (Luyten et al., 2017). On the other hand, appropriate care is possible only if parenting thoughts and goals are regulated and integrated into specific plans of action (Dix, 2000; Shaffer & Obradović, 2017). Additionally, parents emotional and behavioral responses should be adequately modulated in order to appropriately respond to their child's actual communications, and to scaffold activities with them (Morris et al., 2007; Shaffer & Obradović, 2017). Being able to rely on efficient cognitive processes could provide parents with adequate coping strategies that enable them to successfully solve challenging times during parent-child interactions (Deater-Deckard et al., 2012). Child behaviors that are highly distressed or oppositional are demanding to manage (Deater-Deckard et al., 2012). During these difficult situations, parents should evaluate the events occurring and find appropriate strategies to regulate their thoughts and emotions, and subsequently perform adequate behavioral responses (Crandall et al., 2015). These responses are necessary to regulate child behavior, modulating distress or reducing defiant attitudes (Lorber et al., 2003). When parental responses are not effective there is the risk that high levels of negative affect become a stable relational pattern, increasing the risk for child maltreatment and child conduct problems (Deater-Deckard & Sturge-Apple, 2017; Smith et al., 2014). As we will see in Chapter 4, different cognitive mechanisms linked to functional parenting practices are often damaged by the reiterated assumptions of substances, representing one of the possible mechanisms explaining the interactive difficulties observed in this clinical population.

A growing body of literature points out that, within the more global domain of cognitive functioning, parental reflective functioning and parental executive functions could be important

aspect involved in parents' understanding of their children's communications as well in their own emotional and behavioral regulation (Deater-Deckard et al., 2010; Krink et al., 2018; Slade, 2005). Reflective functioning, refers to the broader domain of mentalizing, and is defined as the parent's ability to conceive his/her child's behaviors as motivated by internal mental states (Fonagy et al., 1991). Moreover, it also refers to the caregiver's ability to reflect upon his/her own internal mental experiences, considering how they are shaped by interactions with the child, and how they may influence thoughts, feelings, and behaviors toward the child (Sharp & Fonagy, 2008; Slade, 2005). The experience of appropriate parental reflective functioning, supports the development of emotion regulation, effortful control, and sense of autonomy in children, enhancing the possibility to develop secure attachment relationships (Fonagy et al., 1991; Slade, 2005). Different studies pointed out the links between parental reflective functioning and quality of parenting behaviors (Grienberger et al., 2005; Pajulo et al., 2008). Specifically, higher reflective functioning has been linked to more maternal sensitivity, successful positive engagement, and less intrusiveness during mother-child interactions (Grienberger et al., 2005; Pajulo et al., 2008; Smaling et al., 2016), whereas lower mentalizing abilities have been associated with more negative maternal parenting behaviors, such as negativity, controlling parenting, and intrusiveness (Stacks et al., 2014).

Executive functions refer to a group of top-down mental processes needed to control thoughts and behaviors when going on automatic or relying on instinct or intuition would be ineffective (Burgess & Simons, 2012; Espy, 2004; Miller & Cohen, 2001). Executive functions are constituted by three "lower order" components, which are inhibitory control, working memory and cognitive flexibility (Diamond, 2013; Lehto et al., 2003; Miyake et al., 2000), that allow the activity of "higher order" executive functions, such as reasoning, problem solving and planning (Collins & Koechlin, 2012; Diamond, 2013; Lunt et al., 2012). These cognitive mechanisms subserve the capacity of the individual's self-regulation, and reductions in these mechanisms underlie many situational risk factors related to poor self-monitoring (Hofmann et al., 2012). In the context of caregiving, executive functioning enables the parent to reflect upon the ongoing situation and to consider the potential

responses, promoting the modulation of thoughts and emotions, and subsequently reducing the risk to enact impulsive and dysfunctional behaviors (Barrett et al., 2004; Ochsner & Gross, 2008).

Executive functioning could support the management of stressful situations, lowering anger and frustration in front of challenging child behaviors (Barrett & Fleming, 2011). Specifically, many dysfunctional parenting practices, as intrusiveness or harsh discipline, could be linked to deficits in self-regulation (Okado & Azar, 2011; Shaffer & Obradović, 2017). Parents with poorer executive functioning tend to be more emotionally and behaviorally reactive to child behavioral problems, increasing the risk to consolidate negative relational patterns (Deater-Deckard et al., 2010). On the other hand, caregivers' ability to ignore distractions, inhibit impulses, and shift personal goals is related to positive and cooperative interactions with their children (Cuevas et al., 2014). In this, parental self-regulation has been related to more positive parenting and less negative caregiving strategies across the course of childhood (Crandall et al., 2015). In environmental stressful conditions, the different components of maternal executive functions predicted harsh parenting (Deater-Deckard et al., 2012). Specifically, working memory was found to mediate the relationship between early life adversity and sensitivity in early infancy (Gonzalez et al., 2012), and was associated with observations of harsh reactive parenting with 6-year-old children (Deater-Deckard et al., 2010). At the same time, parental inhibitory control presented associations with maternal responsive behaviors in the context of free-play and disciplinary interactions with kindergarten-age children (Shaffer & Obradović, 2017). These results seem to support the role of executive functioning in sustaining quality of parenting and of adult-child interactions across a wide range of ages and contexts. In this sense, the role of parental cognitive mechanisms should be carefully considered, both in low-risk and high-risk situations, also in the light of the possible interactions that they could have with other psychological features of the adult. In fact, different studies point out how executive functioning might be affected by psychopathology (Bloemen et al., 2018; Stordal et al., 2005) or to situational difficulties (Andrews et al., 2021; St. John et al., 2019)

Why studying parenting in the context of substance use disorder

The diagnosis of Substance Use Disorder (SUD), encompasses a series of disturbances that range from abuse to dependence and includes an ample group of substances (APA, 2013; Hasin et al., 2013). SUD represents an increasing global risk factor for disability and premature death, with significant economic costs for the society (Peacock et al., 2018). Given its specific reliance on external chemicals, this diagnosis represents a clinical entity different from other forms of psychopathology, with specific needs to be addressed, both in terms of treatment and of parenting (Catalano et al., 1999; Minkoff et al., 2004; Padwa et al., 2013). Specifically, within the conditions that affect quality of caregiving, parental SUD exerts a specific effect, given its impact both on the physical and on the psychological level (Hans, 1999; N. Suchman, Pajulo, DeCoste, et al., 2006). Moreover, as highlighted following, parental SUD also affects the newborn wellbeing, further impacting on the transactional dynamics that characterize parent-child interactions (Behnke & Smith, 2013; Tronick et al., 2005). Alcoholism and substance misuse are not uncommon among adults of child-bearing age, and they are associated with higher risk for children wellbeing (Armstrong et al., 2003). Nearly 90% of women who struggle with SUD are in child rearing age (Kim et al., 2017) and maternal SUD is a risk factor for parenting and child development (Bandstra et al., 2010). Children of parents with substance misuse have an increased lifetime prevalence of anxiety, and mood disorders with respect to non-exposed pairs (Cuijpers et al., 1999; Mansoor et al., 2012). Different studies provide evidence of a pattern of intergenerational transmission of substance use and other risk behaviors (Neppl et al., 2020; Tiberio et al., 2020).

Offspring exposed to substances in utero are at higher risk for perinatal complications as prematurity and reduced growth measures at delivery (Stein & Harold, 2015). After delivery, neonates exposed to opiates or other drugs may present symptoms of neonatal abstinence syndrome (Hudak et al., 2012). Thus, substance consumption during pregnancy is harmful for the fetus and can

result in neurodevelopmental disorders (Stratton et al., 1996) and substance-related syndromes, characterized by impaired growth, structural anomalies, and developmental delays (Jones et al., 1973).

Besides the direct effects of substance exposure, quality of parenting represents an important mediator of undesired developmental outcomes (Bandstra et al., 2010). Differently from low-risk populations, mothers with SUD are at higher risk to present dysfunctional parenting behaviors (Das Eiden, 2001; Flykt et al., 2012; Frigerio et al., 2019; Porreca et al., 2016; Salo et al., 2010), which are linked to later psychological and developmental difficulties in offspring (Behnke & Smith, 2013; Swanson et al., 2000), and a higher risk to be involved with child protective services (Matos et al., 2014). Moreover, mothers with SUD tend to adopt negative strategies during disciplinary contexts (Blackwell et al., 1999; Strathearn & Mayes, 2010), which are more likely to be ineffective and related to internalizing and externalizing problems (D'Onofrio et al., 2007; Misri et al., 2006). Therefore, quality of parenting behaviors across different domains constitute one of the main targets of investigation in the condition of SUD, to avoid unfavorable developmental outcomes in children through targeted interventions (Suchman et al., 2004, 2006). Further understanding the characterization of parenting behaviors in this clinical population could help to better tailor interventions and to prevent undesired consequences on offspring physical and emotional wellbeing.

On the other hand, problems related to alcohol and substance misuse often coexist with other clinical conditions, as anxiety and depression (Stein & Harold, 2015), which represent an additional risk factor for parenting and should be specifically addressed. An additional comprehension of the effects of psychopathology on quality of parenting could provide supplementary strategies for treating quality of parenting in this condition.

Finally, a growing number of studies shows the relevance of investigating SUD-related cognitive impairments, a direct consequence of the neurobiological damages of addiction (Aharonovich et al., 2006; Landi et al., 2011a), to better understand which mechanisms could further detriment quality of parenting in this clinical population (Håkansson et al., 2015; Porreca et al., 2018). This seems

particularly important in the light of recent studies that highlight how proper cognitive functioning could support parents in the adequate organization of parental attitudes and planning of appropriately nurturing responses.

To overcome the gaps in the literature the empirical studies presented in the following chapters will further investigate the configuration of parenting behaviors in this clinical group (Chapter 2) and their associations with psychopathology (Chapter 3) and cognitive functioning (Chapter 4). Subsequently, based on the extant literature and on the results of our studies, we propose a study protocol for intervening and enhancing quality of caregiving in mothers with SUD also considering the role of psychopathological and cognitive mechanisms (Chapter 5). Finally, we provide a general discussion of the results of the studies presented, tracing some suggestions with respect to clinical implications and future directions (Chapter 6).

Chapter 2

Parenting behaviors in the context of SUD: Patterns of Emotional Availability among mothers with substance misuse and their young children

Chapter 2: Filippi, B., Porreca, A., De Carli, P., Simonelli, A. (in preparation). Patterns of Emotional Availability among mothers with substance misuse and their young children: associations with maternal psychopathology and socio-demographic risk factors.

Abstract

In this study we examined mother-child interactive behaviors in the context of SUD investigating patterns of emotional availability (EA) – that is the capacity of a dyad to share an emotionally healthy relationship (Biringen, 2008) – and examining their associations with individual factors and maternal psychopathology, in order to provide a global index of the quality of mother-infant interactive behaviors and dyadic structure.

The study involved 77 mothers with SUD (Mage=28.55yrs, SD=6.41) and their children (47% male, Mage=12.47mths, SD=15.04). Mother-child interactions were observed and rated with the Emotional Availability Scales (EAS) at the admission of the dyads into a residential Therapeutic Community.

Cluster analysis was used to detect potentially different patterns of dyadic interactions. The different groups of mother-child dyads were examined in relation to contextual and clinical variables, assessed through specific checklists, and to maternal psychopathology, measured through the SCL-90-R.

Four EA patterns were identified: (a) “low functioning dyads” (b) “inconsistent dyads”, (c) “inconsistent mother with low functioning child”, and (d) “functioning dyads.” These patterns presented significant differences with respect to clinical variables inherent SUD and pregnancy, and marginally significant differences with respect to psychopathology.

These findings make a contribution to the understanding of mother-child interactions in the context of maternal substance use disorder. Implications for assessment and treatment are discussed.

Introduction

Parenting in the context of SUD

In the context of high-risk parenting, parental Substance Use Disorder (SUD) constitutes a condition that could interfere with parenting functions, severely affecting the quality of parent-child relationships and child development (Hans & Jeremy, 2001; Parolin & Simonelli, 2016). Children of parents with SUD are at higher risk for child abuse and neglect (Ammerman et al., 1999; Dunn et al., 2002) and for being involved with child protective services (Jones, 2004). Most of the literature in this field primarily considered mothers, given their role as the child's primary caregiver, and only to a lesser extent focused on fathers (McMahon & Rounsaville, 2002; Stover et al., 2012). Nearly 90% of women who struggle with problems linked to substance misuse are in child rearing age (Kim et al., 2017) and several studies evidence the increased risk for the intergenerational transmission of SUD use and other behavioral and emotional problems between mother and child (Nepl et al., 2020; Tiberio et al., 2020).

The unfavorable developmental outcomes of children exposed to substances in utero have been widely reported by the literature, beginning in early infancy and extending throughout childhood and adolescence (Bandstra et al., 2010; Thompson et al., 2009). The increased risk for negative outcomes affects several areas of functioning, including language, cognitive, emotional, social and behavioral functioning (Bandstra, 2002; Minnes et al., 2010; Pulsifer et al., 2007), as well as early interactions with caregivers (Johnson et al., 2002). Vast research suggests that many of these hurdles are not only influenced by the direct effects of fetal drug exposure but may be due to multiple environmental factors, as less optimal conditions in home and social environments, and less optimal parent–infant interactions (Hans, 2002; Nair et al., 2003). Specifically, early exposure to maladaptive caregiving practices, such as maternal insensitivity, has been pointed out as an important mediator of short-term and long-term difficulties (Belsky et al., 2007; Das Eiden, 2001). For these reasons, a wide array of

research in the area of parent-infant relationships focused on the effects SUD on parenting behaviors, which represent the most direct and observable component of caregiving (Bornstein, 2002). As a group, mothers with SUD present a marked reduction in sensitive parental responses, which are less contingent, attuned, and coherent with infant signals and communications (Eiden et al., 2011; Tronick et al., 2005). Moreover, they might oscillate between a rigid and authoritarian parenting style, characterized by low tolerance, aggressive behaviors, and punishments (Baker & Carson, 1999; Bauman & Dougherty, 1983; Eiden et al., 2011), and caregiving practices identified by high levels of permissiveness, lack of supervision and control (Baker & Carson, 1999; Strathearn & Mayes, 2010). These hurdles are observable across different contexts and affect several parenting domains (Blackwell et al., 1999; LaGasse, 2003).

Recent literature suggests that negative parental responses are linked to the dysregulation of the neural reward and stress networks responsible for the detection of infant cues (Kim et al., 2017; Lowell et al., 2020; Rutherford & Mayes, 2019). Specifically, craving and addiction heavily affect a series of brain regions that partially overlap with the neurobehavioral networks of parenting, reducing the activation in front of child-related sounds and visual stimuli (Landi et al., 2011), and finally decreasing the saliency of infant cues (Kim et al., 2017; Rutherford et al., 2011).

Moreover, several individual and contextual risk factors often associated with SUD, as stressful life events, witnessing violence, childhood sexual or physical abuse and health problems, contribute to create a less optimal social and caregiving environment which could further interfere with sensitive parenting, influencing mother-child interactions and child development (Kang et al., 1999; T. L. Simpson & Miller, 2002). In particular, vast research highlights a significant co-morbidity between SUD and other mental health problems, with individuals struggling with substance misuse being more inclined to report symptoms related to mood dysregulation, anxiety, traumatic events, and sleep disturbances (Conroy & Arnedt, 2014; Currie et al., 2005; Mager & Janca, 1992; Pasche, 2012; Salloum & Brown, 2017). Empirical evidences point out that, in parents without SUD, the presence of psychopathological symptoms negatively affect caregiving practices, with mothers with

postpartum depression and anxiety disorders showing less sensitivity toward their child (Licata et al., 2016). Other studies reported negative associations between maternal sensitivity and depression, both chronic and in remission (Martins & Gaffan, 2000; Murray et al., 2010; Shay & Knutson, 2008), maternal anxiety (Murray et al., 2009; Stevenson-Hinde et al., 2013), and maternal postpartum obsessive-compulsive disorder (Challacombe et al., 2016; Nath et al., 2019). These results were replicated also in the context of maternal SUD, where severe psychopathological symptoms were linked to poorer parenting behaviors, suggesting that the co-occurrence between substance misuse and additional psychopathology is likely to exacerbate problematic parenting behaviors and difficulties experienced in caregiving practices (De Palo et al., 2014; Hans, 1999).

Quality of parenting behaviors in mothers with SUD: the role of Emotional Availability

An increasing body of literature highlights that caregiving practices and parent-child relationships, especially in early infancy, largely rely on emotional and affective processes (Sorce & Emde, 1981; Trevarthen, 2017; Tronick, 1989). Parents primarily communicate with their children through the expression of emotions (Marc H. Bornstein et al., 2012) and, thanks to a varied set of vocal characteristics, facial expressions, and gestures, engage them, directing and maintaining their attention, and consolidating the rhythm of expectable interactive patterns (Beebe & Lachmann, 2002; Cohn & Tronick, 1988; Feldman, 2016). In this, the emotional quality of parenting behaviors, rather than the procedural features per se, is a key ingredient in fostering or preventing multiple developmental achievements in the child (Bornstein et al., 2012; van Der Voort et al., 2014). This process is transactional, with an important role of children that, through different vocal, visual and behavioral cues, express their emotional states and needs to their parents, enabling them to respond coherently (Biringen & Robinson, 1991; Sameroff, 1975). The emotional qualities characterizing parenting behaviors and parent-child interactions are of particular importance in the context of maternal SUD, where prolonged and repeated exposure to substances is likely to disrupt emotional regulation and expression both in the mother and the child (Beckwith et al., 1999; Tronick et al.,

2005). During the last thirty years, the construct of Emotional Availability (EA; Biringen & Robinson, 1991; Biringen & Easterbrooks, 2012; Sorce & Emde, 1981) gained increasing consensus in the literature as a useful empirical way to conceptualize the emotional and transactional qualities of parent-child relationships, and to subsequently investigate parenting in low and high-risk contexts (Biringen et al., 2014; Saunders et al., 2015). EA represents a key aspect of parenting of quality and refers to the possibility for adult-child pairs to share a wide range of emotions and communications within a functional and mutually fulfilling emotional connection (Biringen & Easterbrooks, 2012; Biringen & Robinson, 1991; Emde, 2000). EA originates drawing from attachment (Ainsworth et al., 1978; Bowlby, 1969), psychodynamic (Mahler et al., 1975), emotional (Sorce & Emde, 1981), and transactional theories (Arnold Sameroff, 1975). It is operationalized via the Emotional Availability Scales (EAS; Biringen, 2008; Biringen et al., 1998), six scales which consider different domains inherent parenting behaviors and the child's interactive abilities. The scales, which are currently used in their fourth version, include four adult's dimensions (sensitivity, structuring, nonintrusiveness and nonhostility) and two child's dimensions (responsiveness and involvement of the adult), yielding six different behavioral perspectives on dyadic functioning (Biringen et al., 2014; Bornstein et al., 2012). Sensitivity refers to adult affects, clarity of perceptions and appropriate responses to the child's bids. From the perspective of EA, a sensitive adult is able to adopt a series of emotional and behavioral strategies aimed at effectively creating and maintaining a positive, healthy emotional connection with the child (Biringen et al., 2014; Saunders et al., 2015). Structuring refers to the capacity of an adult to support the child's learning and guide him/her toward a higher level of understanding, through the provision of preventive and effective suggestions (Biringen et al., 2014; Saunders et al., 2015). Structuring involves both scaffolding during play activities and limit-setting during disciplinary contexts. Nonintrusiveness refers to the ability of an adult to follow the child's lead during activities and avoid interfering, whereas Nonhostility refers to the appropriate regulation of negative emotions, avoiding expressing them towards or in front of the child (Biringen et al., 2014; Saunders et al., 2015). Child responsiveness to the adult and child involvement of the adult encompass the child's degree of

EA, referring respectively to the regulation of affects and willingness to be engaged in activities, and to the initiatives made to engage the caregiver (Biringen & Easterbrooks, 2012). Thus, EA and the EAS represent a dyadic measure of parent-child relationships, considering both parenting behaviors and child interactive features, and stressing the contribution of each partner and the mutual influence on each other (Biringen, 2008; Biringen et al., 1998; Biringen & Robinson, 1991; Biringen & Easterbrooks, 2012). Given their flexibility to different settings (Easterbrooks et al., 2012; Sagi et al., 2002; Ziv et al., 2000) and child ages (Biringen et al., 2014; Bornstein et al., 2012) the EAS have been applied to different clinical populations, including mothers with SUD (Flykt et al., 2012; Salo et al., 2010). In regard to this, many studies have demonstrated that drug abusing mothers show lower general EA in comparison with low-risk mothers (Fraser et al., 2010; Frigerio et al., 2019), exhibiting the presence of inconsistency during interactions, as well as detachment (Porreca et al., 2018; Salo et al., 2009a; Swanson et al., 2000).

More specifically, regarding EA, mothers with SUD were less emotionally connected and sensitive in perceiving and responding to their children signals (Fraser et al., 2010; Porreca et al., 2016), showed difficulties in guiding and supporting child's play or exploration (Frigerio et al., 2019; Pajulo et al., 2001; Salo et al., 2010). Intrusiveness and hostility were common in this group with a negative impact on children affective and relational development, as evidenced by the high rates of avoidant or disorganized/disoriented attachments (Swanson et al., 2000). On the other hand, children of mothers with SUD, in most cases exposed to substances in utero, were irritable and with difficulties in emotion regulation, presenting problematic interaction patterns as well (Porreca et al., 2018). For examples, they may be detached and express much negative affect, tending not to initiate new interactions or to respond to their mother's suggestions and interactive signals, showing low scores in the child responsiveness and involvement dimensions (Salo et al., 2009, 2010). The results of these studies highlight how the condition of SUD could transversally affect different characteristics of the mother and the child, supporting the adoption of the EAS as a useful tool to capture how diverse impairments could transactionally influence each member of the dyad in this clinical group. However,

as far as we know, all the studies on EA in the context of SUD focused on “individual” characteristics within the dyad, even though EA was originally conceptualized as a dyadic construct (Biringen & Easterbrooks, 2012). The adoption of a person-oriented approach (Easterbrooks et al., 2005; Mingo & Easterbrooks, 2015) which simultaneously investigates patterns of dyadic interactions could provide a global index of the quality of mother-infant interaction and dyadic structure, in order to assess risk factors of a specific relationship and to plan specific therapeutic interventions. Previously, this approach was successfully adopted with different clinical (Trupe et al., 2018) and non-clinical groups of parent-child pairs (Easterbrooks et al., 2005; Mingo & Easterbrooks, 2015). In these studies, the possibility to investigate patterns of EA allowed to identify different levels of dyadic functioning, highlighting associations with individual and contextual variables. More specifically, working with young mothers and their children, Easterbrooks and colleagues (Easterbrooks et al., 2005; Mingo & Easterbrooks, 2015) found four distinct patterns of EA, reflecting synchrony and asynchrony between maternal and child behavior. In their first study (Easterbrooks et al., 2005) they found low-functioning dyads, average dyads, average parenting/disengaged infants, and high-functioning dyads, which differed on outcomes such as depressive symptomatology, social support, and relationships with their own mothers. In their second study (Mingo & Easterbrooks, 2015) they found patterns reflecting low functioning dyads, high functioning dyads, low functioning dyads with nonhostile mothers, and inconsistently sensitive mother and responsive child. These patterns presented distinct associations with multiple indicators of the ecological context as parenting attitudes towards child independence, role-reversal, strategies in conflict resolution with the partner and the child, as well as living arrangements (Mingo & Easterbrooks, 2015). In line with these works, in a study on mothers with borderline personality disorders, Trupe and colleagues (Trupe et al., 2018) identified four clusters reflecting high functioning dyads, low functioning dyads, asynchronous dyads, and below average dyads. These different patterns presented associations with diverse contextual and individual risk factors for maternal and child wellbeing. Taken together, the results of these studies highlight the utility of adopting a person-oriented approach to identify different diverse profiles of mother-child

functioning that could guide assessment and intervention practices. This approach could be particularly useful in the context of parental SUD, given the complex interrelation between individual, relational, and contextual factors.

The objective of the present study was to (a) identify patterns of EA in mothers with SUD and their children, and to (b) investigate whether different patterns of EA are associated with variables inherent (b1) socio-demographic information, (b2) past-history, (b3) history of SUD, and (b4) psychopathology. Analyzing maternal and child behavior simultaneously, through cluster analysis, could help highlighting the transactional influences between parenting behaviors and child interactive behaviors, allowing for complex patterns of EA to emerge. Moreover, considering also information inherent socio-demographic characteristics, past-history, clinical history of SUD and psychopathology could help to better identify intervening variables in supporting or jeopardizing quality of parenting behaviors. In line with previous studies adopting the EAS in mothers with SUD we expect our sample (a) to show generally low levels of EA. Moreover, in line with previous studies adopting cluster analysis to identify patterns of EA (Easterbrooks et al., 2005; Mingo & Easterbrooks, 2015; Trupe et al., 2018), we expect the different patterns uncovered in our sample (b) to show associations with socio-demographic characteristics, past-history, clinical history of SUD and psychopathology.

Methods

Participants and procedure

The study involved 77 mothers diagnosed with SUD (Mage = 28.55 years, SD = 6.41 years) and their young children (36 males). Table 1 presents demographic and clinical information of the sample. The mean age of children was 12.47 months (SD = 15.04). The dyads were attending a rehabilitation program in a mother-child residential Therapeutic Community.

For the purposes of the present study only mothers diagnosed with SUD according to DSM criteria (APA, 2013) by expert clinicians on the basis of the patients' anamnesis and of urine toxicology, and who had a child aged between 1 to 60 months at admission in the facility were included.

At the time of admission, most of the group was characterized by low levels of education: just 25% of the mothers had completed high school and the majority (68%) dropped out. Ninety percent of the participants was a single parent and lived with the family of origin before entering the facility. With respect to past history, a high percentage of mothers (68%) faced adverse events during their developmental period, such as psychological, physical or sexual abuse during a lifetime, suicide attempts or losses. Regarding personal history of SUD 45% of mothers experienced an upbringing environment characterized by caregivers' substance related problems or mental illness. They mostly described a pattern of poly-drug use and the majority of them (70%) indicated heroin as the primary substance of abuse. Finally, with respect to pregnancy and motherhood 57% reported that their pregnancy was not desired, and 86% reported they used alcohol or drugs throughout gestation.

After accepting to participate to the study, the mothers underwent a 2-hour assessment aimed at measuring socio-demographic and clinical variables, mother child EA, and maternal psychopathology.

Table 1. Demographic and clinical variables

Maternal characteristics	
Age (years)	28.55 (6.41)
Education (years)	9.55 (2.48)
Familiar history of SUD	34 (45%)
Significant losses	46 (69%)
Experience of maltreatment	51 (68%)
Poly drug use	67 (88%)
Primary substance of abuse:	
Heroin	52 (70%)
Cocaine	7 (9%)
Drug related illness (e.g., hepatitis C)	42 (56%)
Experiences of overdose	23 (31%)
Substitutional therapy	53 (71%)

Parental psychopathology	23 (31%)
Parental deviance	17 (23%)

Children’s characteristics

Gender (male)	36 (47%)
Age (months)	12.47 (15.04)
Desired pregnancy	32 (43%)
Prenatal drug exposure	65 (86%)

Note. Data are given as n (%), mean (standard deviation)

Measures

Socio-demographic and clinical information

Variables inherent sociodemographic characteristics (citizenship; marital status; education;), history of SUD (medical problems associated with drug use; maintenance therapy; poliabuse and primary substance of abuse; overdose; familiar with Substance Use Disorder or mental illness; prenatal substance abuse), and past history (psychological, physical or sexual abuse during a lifetime and suicide attempts) were obtained through the administration of a semi-structured interview at admission to the facility.

Emotional Availability

Mother-child dyads were videotaped during free-play (15 min) interactions. Mothers were given instructions to play and interact with their child as they normally would. Videos were coded using the 4th version of the Emotional Availability Scales (EAS; Biringen, 2008).

EA Scales consist of six dimensions that take into account both the contribution of the adult (i.e. parenting behaviors) and of the child. The adult dimensions are: sensitivity, structuring, nonintrusiveness, and nonhostility. The child dimensions are: responsiveness to the adult and involvement of the adult. Each dimension is evaluated on a 7-point Likert scale, where highest scores represent optimal qualities. For each scale, scores between 5.5 and 7 indicate a more healthy interaction. Scores around 4 indicate the presence of inconsistency (i.e., behaviors that are appropriate

in some way but that are not fully optimal). Scores of 3 or below point out less optimal interactions. Scores lower than 2 indicate low qualities on that dimension. For the purposes of the present study we identified cut-off scores that allowed to distinguish between 3 different groups: low scores (1-3), medium scores (3.5-5), high scores (5.5-7).

Adult sensitivity is a measure of the parent's emotional connection with the child as reflected by behaviors and affective qualities, such as the adult's ability to read the child's signals and respond in a contingent and appropriate way. It includes a wide range of qualities, such as appropriate affects and affective regulation, clarity of perceptions and appropriateness of responses to child's signals, awareness of timing (e.g., transitions between activities and adjusting to the child's rhythms), flexibility, variety and creativity in the modalities of play and interaction, acceptance towards the child, the total amount of interactions and conflict resolution.

Adult structuring is a measure of the quality and degree to which the parent supports and scaffolds the child's play or exploration. It concerns the adult's ability to guide, taking into account the quality of the suggestions provided and their effectiveness, the amount of structuring, the ability to provide limits and boundaries and rules where required in a preventive and non-reactive manner and to remain firm in the face of the pressure of the child. Moreover, it considers the use of verbal and non-verbal structuring, and the fact that the adult does not assume a peer role, but maintain the adult role during interactions, giving a sense of containment and feeling of security to child.

Adult nonintrusiveness refers to the ability of being available to the child without being intrusive in a series of behavioral ways which limit the child's autonomy. It includes the ability to follow the child's lead rather than oversuggesting/overmentoring and to identify optimal breaks to enter interaction, rather than interrupting the activities in progress; moreover it considers the absence of commands and directives, the ability of talking to the child in a two-way communication; the presence

of didactic teachings are also taken into consideration, as well as the presence of physical and verbal interference, and finally the fact that the adult is perceived as intrusive by the child.

Adult nonhostility is a measure of the degree of covert and overt hostile behaviors that the parent demonstrates during the interactions. It refers to behaviors and expressions that do not reveal the presence of negative affect, at the level of face or voice. Non-hostile interactions present the complete absence of mocking, ridiculing, or other disrespectful statement or behavior, on a manifest or veiled level, in the adult's attitude towards the child, as well as the lack of threats of separation, frightening behaviors or tendencies, hostile play themes or use of silent treatment when is a discipline or tension-filled situation. Finally, it refers to the adult's ability to not lose cool during low and high challenge/stress times.

Child responsiveness is a measure of the degree to which the child accepts and reciprocates the parent's bids for attention; it refers to both the emotional and behavioral responsiveness of the child. The quality of affect, emotional regulation and organization of affect and behavior, the emotional responsiveness to parent's suggestion, age-appropriate autonomy-seeking and exploration, physical positioning, lack of role reversal or over-responsiveness, lack of avoidance and the child's focus to the task are assessed.

Child involvement refers to the degree to which the child attends to and engages the adult in play. It includes simple or more elaborative initiative through the verbal (babbling or talking), visual (eye contact, looking) or body (body positioning, gestures or search for physical contact) channel. The use that is made of the adult – emotional or instrumental – and the lack of over-involvement are also considered.

For the purpose of the present study the videos were coded by two independent raters reliable to the system. Inter-rater reliability was calculated using Intraclass Correlation Coefficients on a randomly selected subsample of 20% of the cases, with values ranging from 0.80 to 0.95.

Maternal Psychopathology

Maternal psychopathology was assessed through the Symptom Checklist 90-Revised (SCL-90-R; Derogatis, 1975), a 90-item self-report questionnaire that gives a standardized measure of the current psychological symptoms and psychological distress. Each item is rated on a 5-point Likert scale, ranging from 0 (not at all) to 4 (extremely). The scores obtained are interpreted based on nine primary dimensions: Somatisation, Obsessive-Compulsivity, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, Psychoticism, and a group of seven additional items useful to evaluate other symptoms (eating and sleep disorders). It includes three global scores: the Global Severity Index (GSI) indicating the general psychological distress; the Positive Symptom Distress Index (PSDI), a measure of distress intensity; and Positive Symptom Total (PST), revealing the number of symptoms the respondent has endorsed to any degree. Continuous scores for each score can be converted into standardized scores and defined as above/below clinical range according to normative values.

The Italian translation and adaptation of the SCL-90-R (Sarno et al., 2011) has been shown to have good internal consistency ($\alpha = 0.68-0.97$) in adolescents and adults.

Statistical analyses

First, descriptive statistics were run on the data, in order to examine mean scores, frequencies, and percentages. Secondly, cluster analysis was adopted to examine the presence of different patterns of mother-child interactions with respect to the EAS scores. Cluster analysis represents a multivariate method that allow to detect pre-existing structures in datasets. Based on mean scores, cluster analysis allowed to identify different patterns of mother-child EA classifying the dyads in internally

homogeneous groups (clusters) differentiating them from externally heterogeneous groups (Blashfield & Aldenderfer, 1988; Kettenring, 2006).

In line with previous studies on EA clustering (Easterbrooks et al., 2005; Mingo & Easterbrooks, 2015) we adopted K-means cluster analysis, specifying four clusters as outcome. Three and five cluster solutions were also investigated, but they were excluded as options due to less optimal fit of the data. Model Based Clustering was subsequently applied to verify the patterns yielded by K-means cluster analysis. A visual inspection of the dendograms supported the outcome of the K-means method. Variables were standardized before they were entered into the cluster analysis. Given the high correlation between maternal sensitivity and maternal structuring, and between child sensitivity and child responsiveness, they were combined into two unique variables.

Following, the four different patterns of mother-child interactions were examined with respect to socio-demographic and clinical variables and concerning maternal psychopathological symptoms. Analysis of variance was adopted for continuous variables, whereas chi square was applied for categorical variables.

Results

Four patterns of mother-child interactions were identified according to EA. The patterns were labeled “low functioning dyads” (Cluster 1, n=14), “inconsistent dyads”, (Cluster 2, n=23), “inconsistent mother with low functioning child” (Cluster 3, n=26), and “functioning dyads” (Cluster 4, n=14). The clusters are presented in Figure 1. The histograms refers to standardized values, with higher scores referring to more optimal qualities observed. Table 2 provides instead mean scores for the EAS referring to each cluster, and reports descriptive information regarding the distribution of the four groups with respect to the different cut-off scores. Examining mean scores and the distribution of the groups across the different cut-offs, it is possible to observe that, except for the “functioning dyads”, most of the subjects in our sample presented scores around or below average, indicating the presence of inconsistency or more

Figure 1. The four patterns of mother-child EA across the SUD sample

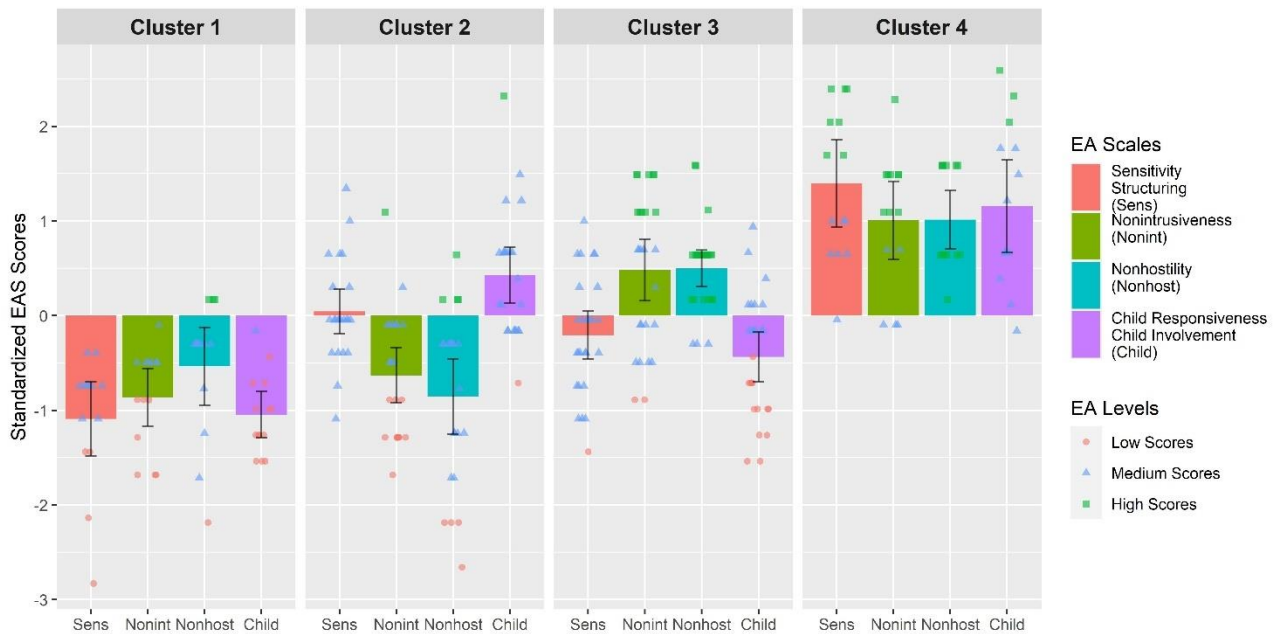


Table 2. Descriptive analyses of the EAS subscales for each cluster.

	Continuous Scores					Clinical cutoff (Frequencies)*		
	N	M	SD	Min	Max	Low scores	Medium scores	High scores
Cluster 1:								
Sensitivity/Structuring	14	3.25	0.49	2.00	3.75	4(29%)	10(71%)	0(0%)
Nonintrusiveness	14	3.04	0.66	2.00	4.00	7(50%)	7(50%)	0(0%)
Nonhostility	14	4.75	0.75	3.00	5.50	1(7%)	10(71%)	3(21%)
Child responsiveness/ Child Involvement	14	2.45	0.38	2.00	3.25	13(93%)	1(7%)	0(0%)
Cluster 2:								
Sensitivity/Structuring	23	4.07	0.39	3.25	5.00	0(0%)	23(100%)	0(0%)
Nonintrusiveness	23	3.33	0.85	2.00	5.50	11(48%)	11(48%)	1(4%)
Nonhostility	23	4.41	0.97	2.50	6.00	4(17%)	15(65%)	4(17%)
Child responsiveness/ Child Involvement	23	3.78	0.62	2.75	5.50	1(4%)	21(91%)	1(4%)
Cluster 3:								
Sensitivity/Structuring	26	3.88	0.45	3.00	4.75	1(4%)	25(96%)	0(0%)
Nonintrusiveness	26	4.73	1.01	3.00	6.00	2(8%)	14(54%)	10(38%)
Nonhostility	26	5.85	0.51	5.00	7.00	0(0%)	3(12%)	23(88%)
Child responsiveness/ Child Involvement	26	3.00	0.60	2.00	4.25	13(50%)	13(50%)	0(0%)
Cluster 4:								
Sensitivity/Structuring	14	5.04	0.57	4.00	5.75	0(0%)	7(50%)	7(50%)
Nonintrusiveness	14	5.39	0.90	4.00	7.00	0(0%)	5(36%)	9(64%)
Nonhostility	14	6.39	0.56	5.50	7.00	0(0%)	0(0%)	14(100%)
Child responsiveness/ Child Involvement	14	4.45	0.77	3.25	5.75	0(0%)	11(79%)	3(21%)

Note. Data are given as n (%), mean (standard deviation). *Low scores:1-3, Medium scores 3.5-5, High scores 5.5-7

severe difficulties in interactive behaviors. Specifically, in the “low functioning dyads” group, most of the mothers present scores in the medium or in the low range of EA, and nearly all the children present low scores on interactive behaviors. These mothers presented high levels of inconsistent or non-sensitive responses to their children, high rates of benign and physical intrusiveness, as well as high rates of covert hostility. Children of these mothers tended to present detachment or problematic behaviors during interactions with them. In the “inconsistent dyads” group, both mothers and children presented inconsistency in their interactive behaviors, with apparent sensitivity, with high rates of benign intrusiveness and covert hostility. Their children tended to present interactive behaviors that oscillated between emotional connection and over-connection or slight detachment. In the “inconsistent mother with low-functioning child group”, the mothers showed high rates of inconsistent sensitivity and benign intrusiveness, whereas children oscillated between over-connection and more problematic behavioral responses. Finally, in the “functioning group”, both mothers and children tended to present more functional behaviors, with higher frequencies in the high range, although still showing some aspects of inconsistency during interactions.

Table 3 reports descriptive information inherent socio-demographic and clinical variables that characterize the four groups whereas Table 4 reports the presence of severe psychopathological symptoms across the different symptoms dimension in each cluster.

As far as it concerns socio-demographic variables, it is possible to observe that the years of educations are the only variable that significantly distinguish between the four groups. Specifically, mothers in the “inconsistent dyads” group were the ones reporting less education, whereas mothers in the “functioning dyads” group were the ones to report higher education. As far as it concerns the clinical variables, prenatal drug exposure was the only one distinguishing between the four clusters. Despite, most of the children were prenatally exposed to substances, all the children in the “low functioning group” were exposed to gestational drug assumption. Finally, as far as it concerns the presence of

Table 3. Information inherent socio-demographic and clinical variables that characterize the four groups.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	
Education (years)	M = 9.86, SD = 2.32	M = 8.65, SD = 1.72	M = 9.96, SD = 3.08	M = 10, SD = 2.35	$F(1,75) = 6.78, p = .01$
Children's Age (months)	M = 4.29, SD = 4.20	M = 14.39, SD = 15.76	M = 9.69, SD = 13.48	M = 22.64, SD = 18.14	$F(1,75) = 1.1, p = .30$
Mothers' Age (years)	M = 27.21, SD = 5.58	M = 27.17, SD = 7.19	M = 30.88, SD = 6.08	M = 27.79, SD = 5.81	$F(1,73) = 0.7, p = .40$
Familiar history of SUD	6 (43%)	10 (43%)	11 (42%)	7 (50%)	$X(3) = 0.18, p = .98$
Experience of maltreatment	12 (86%)	14 (61%)	18 (69%)	7 (50%)	$X(3) = 6.34, p = .10$
Poly drug use	11 (79%)	22 (96%)	22 (85%)	12 (86%)	$X(3) = 2.55, p = .47$
Prenatal drug exposure	14 (100%)	16 (70%)	23 (88%)	12 (86%)	$X(3) = 7.95, p = .05$
Parental psychopathology	3 (21%)	6 (26%)	10 (38%)	4 (29%)	$X(3) = 1.63, p = .65$
Parental deviance	2 (14%)	3 (13%)	9 (35%)	3 (21%)	$X(3) = 3.97, p = .26$
Experiences of overdose	5 (36%)	5 (22%)	9 (35%)	4 (29%)	$X(3) = 1.6, p = .66$
Substitutional therapy	7 (50%)	16 (70%)	17 (65%)	13 (93%)	$X(3) = 5.2, p = .16$
Desired pregnancy	7 (9%)	11 (15%)	10 (13%)	5 (7%)	$X(3) = 1.08, p = .78$

Note. Data are given as n (%), mean (standard deviation)

Table 4. Prevalence of psychopathological disorders in each cluster.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	
Somatization	7 (50%)	7 (30%)	11 (42%)	6 (43%)	$X(3) = 1.56, p = 0.67$
Obsessive Compulsive	4 (29%)	7 (30%)	10 (38%)	4 (29%)	$X(3) = 0.66, p = 0.88$
Interpersonal Sensitivity	5 (36%)	7 (30%)	13 (50%)	8 (57%)	$X(3) = 3.45, p = 0.33$
Depression	5 (36%)	10 (43%)	19 (73%)	8 (57%)	$X(3) = 6.78, p = 0.08$
Anxiety	5 (36%)	6 (26%)	13 (50%)	6 (43%)	$X(3) = 3.09, p = 0.38$
Hostility	4 (29%)	6 (26%)	12 (46%)	4 (29%)	$X(3) = 2.73, p = 0.44$
Phobic anxiety	3 (21%)	4 (17%)	7 (27%)	2 (14%)	$X(3) = 1.12, p = 0.77$
Paranoid ideation	5 (36%)	13 (57%)	17 (65%)	8 (57%)	$X(3) = 3.27, p = 0.35$
Psychoticism	6 (43%)	13 (57%)	13 (50%)	8 (57%)	$X(3) = 0.85, p = 0.84$
Global Severity Index	5 (36%)	10 (43%)	14 (54%)	6 (43%)	$X(3) = 1.35, p = 0.72$
Positive Symptoms Total	6 (43%)	8 (35%)	16 (62%)	6 (43%)	$X(3) = 3.78, p = 0.29$
Positive Symptom Distress Index	5 (36%)	14 (61%)	18 (69%)	10 (71%)	$X(3) = 5.14, p = 0.16$

Note. Data are given as n (%), mean (standard deviation)

psychopathological symptoms, it is noteworthy that the four groups marginally differed according to depression, with the “inconsistent mother with low functioning child” reporting higher rates of clinically depressive symptoms.

Discussion

The present study aimed to identify patterns of EA in mothers with SUD and their children, and to investigate whether different patterns of EA are associated with variables inherent socio-demographic information, past-history, history of SUD, and psychopathology. Up to now, most of the literature on parental SUD examined specific maternal and child behaviors separately, which could risk not to provide an accurate reflection of the relationship as a whole (Trupe et al., 2018). The possibility to analyze parent and offspring behavior simultaneously, through cluster analysis, could help highlighting the transactional influences between caregiving and child socio-relational competencies, allowing for complex patterns of EA to emerge (Biringen & Easterbrooks, 2012).

Consistently with other studies on parental SUD (Flykt et al., 2012; Frigerio et al., 2019; Salo et al., 2009b), globally, the dyads in our sample showed relatively low-quality interactive behaviors, mostly characterized by inconsistency, incoherence, and other hurdles, such as detachment and unpredictability, in most of the dimensions examined. Such characteristics have been previously found to be associated with high-risk parental practices, as child maltreatment (e.g., Bauer & Twentyman, 1985; Joosen, Mesman, Bakermans-Kranenburg, & van IJzendoorn, 2012), which are linked to unfavorable developmental outcomes in children (Swanson et al., 2000).

Despite generalized difficulties, cluster analysis allowed to differentiate between different patterns of dyadic functioning within our group. In line with previous studies (Easterbrooks et al., 2005; Mingo & Easterbrooks, 2015; Trupe et al., 2018) we identified four distinct patterns of mother-child EA: “low functioning dyads”, “inconsistent dyads”, “inconsistent mother with low functioning child”, and “functioning dyads”. In the “low functioning” group, mothers presented high levels of inconsistent and non-sensitive responses to their children, with high rates of intrusiveness and covert

hostility (i.e. dissatisfaction, impatience, anger or other concealed forms of hostility that, although not blatant, may be present in the background). These parents oscillated between exhibiting forms of unhealthy emotional connection and other extreme types of interaction, frequently characterized by recurrent intrusions into their offspring's activities and difficulties in the regulation of negative emotions. In the literature of parental SUD, it has been well established the link between intrusive parental behaviors and insecure or disorganized attachments (Swanson et al., 2000). Moreover, a significant body of research points out that hostile parenting increases risk for behavior problems in children (Scaramella et al., 2002; Smith et al., 2014), and is likely to be transmitted across different generations (Scaramella & Conger, 2003). Children of these mothers presented the highest rates of dysfunctional interactive behaviors, showing detachment or less organized demeanors during free-play with their mothers. This aspect could be linked to the fact that offspring within this group had the uttermost proportion of prenatal drug exposure, which is a risk event often coupled with diminished responsiveness to novelty and stressful situations, a decreased baseline arousal, and greater behavioral lability and impulsiveness (Mayes et al., 1998; Bandstra et al., 2010). This altered pattern of arousal and stress response could decrease the readability and the predictability of emotional signals, affecting children's EA and representing an additional challenge for parental sensitive behaviors (Tronick et al., 2005).

Mothers in the "inconsistent" group presented behavioral responses that were less insensitive compared to the previous group, but nonetheless characterized by inconsistency and incoherence with respect to children's signals, as well by high rates of benign intrusiveness (i.e. the tendency to exceed with directives, didactic teaching or overprotectiveness) and hostility. Parental inconsistency, which is often characterized by the presence of warm love that lacks of continuity and stability across settings or emotional signals, has been frequently mentioned as one of the factors that may confuse the child, damaging learning and socialization processes (Dwairy, 2007; Rholes et al., 1998). Inconsistency has been associated to a high probability to develop separation anxiety and school phobia (Hersov, 1960), as well to higher rates of insecure attachments (Cassidy & Berlin, 1994; Ziv

et al., 2000). In line with these data, children in the “inconsistent” group presented interactive behaviors that were mostly characterized by emotional connection and over-connection, with anxiety-related limits in children’s autonomy.

In the “inconsistent mother with low-functioning child” group, the mothers showed high rates of inconsistent sensitivity with some forms of slight detachment. Differently from the mothers of the previous group, these mothers did not present high rates of intrusiveness and hostility, suggesting a passive demeanor rather than an active-intrusive one. Notably, mothers in this group reported the highest depressive symptoms, which have been extensively linked to a passive demeanor and less engagement during interactions with their children (Field et al., 2006; Forbes et al., 2004).

Moreover, mothers with depressive symptoms tend to show a type of inconsistency characterized by a quick termination of eye contact (Feldman, 2007), as well by a longer and less predictable duration of vocal-switch pauses (Cohn & Tronick, 1988; Jaffe et al., 2001). This is in line with the theoretical framework of EA, which posits the existence of different forms of inconsistency across caregivers (Biringen, 2008). Moreover, these characteristics present implications for children's development and social competencies (Crnic & Lin, 2021). Offspring of depressed mothers tend to adopt a “depressive” interactive style, being less engaged and responsive to familiar and non-familiar adults (Field et al., 1988), or to display more tantrums and negative affect (Dawson et al., 1999). This is in accordance with the results of our study, where children oscillated between over-connection/negative emotionality and more problematic and withdrawn behavioral responses.

Finally, in the “functioning group”, both mothers and children tended to present more functional behaviors, with higher frequencies in the high range, indicating the presence of a healthy emotional connection. Most of the mothers were adequately sensitive to their children’s emotional signals, nonintrusive, and none of them presented signs of overt or covert hostility. Notably, this was the only group where all the subjects’ nonhostility scores were in the high range, suggesting a complete absence of struggles with negative emotion regulation during the episodes considered. Additionally, these adults presented the highest educational level across our group, a variable often linked to

supportive parenting (Hoff, 2003; Neitzel & Stright, 2004). Concurrently, children in this group were more responsive and appropriately involving with their caregivers, showing pleasure and eagerness to engage with their mothers. Nonetheless, part of these children showed some inconsistencies in their behavioral responses, with slight signs of anxiety and limited autonomy, suggesting the importance of further considering the very subtle compromises that can occur within this clinical group (Tronick et al., 2005).

Globally, the results of this study support the hypothesis that distinguishing different patterns of interactive behaviors between mother and child could better help to understand variations in caregiving in the context of parental SUD, strengthening assessment and intervention protocols. Our data highlight that, to some extent, the four groups differentiate according to socio-demographic, clinical, and psychopathology-related variables. These outcomes sustain the assumption that, when working with parents with SUD and assessing quality of parenting behaviors, it is necessary to consider also individual and contextual factors, in order to benefit from a more global and inclusive perspective.

The present study presents a series of limitations. The first limitation refers to the small number of subjects involved in the research design. The possibility to adopt a larger sample in future could allow to further investigate quality of dyadic functioning in this clinical group, identifying whether other patterns of mother-child EA, which were not found in our data, are present. A second limitation is linked to the absence of a control group, which would permit to compare the distribution of different behavioral patterns across clinical and non-clinical samples. A third limitation concerns the heterogeneity of children's age that we tried to buffer through the adoption of the EAS, which foresee a coding system that for each child variable considers age-appropriate behavioral responses. Finally, a fourth limitation concerns the absence of measures further targeted at children's characteristics (e.g. temperament or presence of emotional/behavioral problems), which could facilitate to comprehend their contribution in modelling the relationship with their parents.

Clinical implications

Notwithstanding the mentioned limitations, the results of the present study offer a series of clinical implications that could inform the implementation of assessment and treatment policies for parents with SUD. Clinical work with mothers with SUD presents a series of individual, contextual, and relational complexities that should be timely recognized and dealt with, in order to provide a global and comprehensive intervention. Our work highlights the usefulness of identifying distinct patterns of mother-child interactive behaviors, which can be related to different socio-demographic, clinical, and individual variables. Indeed, the presence of different relational difficulties and strengths is linked to different factors. Moreover, these data support the need to adopt a relational approach during clinical work with these dyads, given that children as well contribute in shaping the quality of relationship. In this sense, assessment protocols should be set in a fashion that allow to capture behavioral challenges while also considering specific individual, contextual, or relational characteristics.

This attempt could have important implications for clinical interventions with parents with SUD. In the context of this high-risk group, the possibility to rely on an extended network of information involving each mother-child pair could help to better tailor treatment on the needs of each patient, addressing to the specific resources and vulnerabilities that each specific parent-child pair faces during their treatment course.

In conclusion, this is the first study specifically aimed at examining patterns of EA in the context of parental SUD, highlighting different behavioral clusters that presents distinct associations with socio-demographic, psychopathological and clinical variables. Future studies could explore whether other aspects are involved in the organization of these patterns, as for example parental attachment representations (Flykt et al., 2012; Porreca et al., 2016) or cognitive functioning (Porreca et al., 2018), which have been previously found related to mother-child EA. Lastly, upcoming studies should longitudinally investigate whether these behavioral patterns present distinct clinical courses and differential receptiveness to treatment.

Chapter 3

Psychopathology and parenting in the context of SUD: A study on the implications of maternal alexithymia with respect to quality of parenting behaviors

Chapter 3: Porreca, A., De Carli, P., Filippi, B., Parolin, M., & Simonelli, A. (2020). Mothers' alexithymia in the context of parental Substance Use Disorder: Which implications for parenting behaviors? *Child Abuse & Neglect*, *108*, 104690.

Abstract

In this study we examined the role of additional psychopathological symptoms on quality of parenting in the context of SUD. Specifically we investigated the impact of maternal alexithymia on parenting behaviors in mothers with SUD. The study involved 60 women in residential treatment for SUD and their children. The participants were assessed with respect to alexithymia, quality of parenting behaviors, and depressive symptoms. Forty-three percent of the mothers reported the presence of alexithymia. These mothers presented with significantly low scores on sensitivity ($\beta = -.25, p < .05$) and structuring ($\beta = -.32, p < .05$). After controlling for depressive symptomatology, the effect of alexithymia on parenting behaviors remained only for structuring ($\beta = .35, p < .05$). The findings indicate that, in the context of SUD, maternal alexithymia significantly impacts the quality of parenting behaviors, specifically structuring, indicating that difficulties in becoming aware of one's own feelings jeopardize the ability to scaffold interactions and set age-appropriate limits in an emotionally attuned way. Clinical implications of the findings are discussed.

Introduction

Maternal substance use disorder (SUD) represents a major public health concern constituting a severe risk for parenting and quality of parent-child relationships, subsequently affecting children's well-being (Hans & Jeremy, 2001; Johnson, Glassman, Fiks, & Rosen, 1990; Parolin & Simonelli, 2016). Prolonged substance use during pregnancy is associated with medical sequelae for women and complications in fetuses, such as malnutrition, altered placental functioning, and congenital and neurological abnormalities, leading to an increased risk for premature births, reduced growth measures, and neonatal abstinence symptoms at delivery (Behnke & Smith, 2013; Kelly, 2002; Patrick et al., 2012). Once discharged from the hospital, women with SUD can rarely rely on stable and supportive households and social environments, which could support parental practices and recovery from drug addiction (Chance & Scannapieco, 2002; Connell-Carrick, 2003). In the long run, intoxication and withdrawal from substances might compromise parents' ability to provide a stable, safe, and nurturing caregiving environment for their offspring (Cleaver et al., 2007). Specifically, once babies are born, mothers with SUD are more inclined to engage in dysfunctional parenting practices, exposing their offspring to higher risk for neglect and maltreatment, as well as higher involvement with child protective services (Boden et al., 2013; Minnes et al., 2008; O'Donnell et al., 2009; Olsen, 2015; Prindle et al., 2018). Indeed, parental substance use doubles the risk of child abuse and is implicated in up to 40% of cases of child maltreatment and up to 80% of cases of foster care in the US (Fernandez & Lee, 2013; Jones, 2004; Testa & Smith, 2009; Prindle et al., 2018).

The consequences to children of drug exposure in utero are widespread, ranging from physical to mental health difficulties. In particular, newborns and infants exposed to substances are at higher risk to develop attentional, emotional, and behavioral difficulties, as well as developmental delays, which can already be detectable in the postpartum period and can show up later on during infancy, toddlerhood, preschool and school age (Griffith et al., 1994; Hagan et al., 2016). Short-term effects of prenatal drug exposure mainly involve fetal growth, congenital anomalies, and neurobehavioral difficulties, such as poor alertness and orientation, impaired autonomic regulation, and abnormalities

of muscle tone (Eyler & Behnke, 1999; Hulse et al., 1997). In the long run, drug assumption during pregnancy has an impact on offspring's growth, cognitive and linguistic development, emotional and behavioral regulation, and academic achievement (Bandstra, 2002; Davies & Bledsoe, 2005; Fried et al., 2001; Goldschmidt et al., 2004). These difficulties could further compromise parenting attitudes, additionally undermining children's socioemotional well-being and adjustment (Beeghly & Tronick, 1994).

As far as it concerns parents, difficulties in multiple dimensions of caregiving behaviors, observable during everyday interactions with the child, represent some of the most powerful and immediate evidence of the detrimental effects of substance use on parenting and on the parent-child relationship. The theoretical and empirical frame of Emotional Availability (Biringen, Derscheid, Vliegen, Closson, & Easterbrooks, 2014; Biringen & Robinson, 1991; Saunders et al., 2017), which conceptualizes parenting in terms of emotional connection with the child, suggests that SUD could impact a wide range of caregiving domains, affecting parental sensitivity, structuring, nonintrusiveness, and nonhostility (Flykt et al., 2012). This seems especially true for mothers, which were the primary caregivers mostly taken into account in studies on parental SUD (e.g. McMahon et al., 2008; McMahon & Rounsaville, 2002). Compared to low-risk populations, mothers with SUD are described as less sensitive toward their infants' communicative signals, showing less contingent responsiveness and dyadic reciprocity during emotional exchanges (Eiden, 2001; Flykt et al., 2012; Frigerio et al., 2019; Porreca et al., 2016; Salo et al., 2009; Salo et al., 2010; Swanson et al., 2000). In addition, their parenting behaviors are characterized by less positive emotional expression and higher hostility (Fitzgerald, Kaltenbach, & Finnegan, 1990; Johnson et al., 2002; Pajulo et al., 2001), suggesting severe challenges in the possibility to create a healthy and rewarding emotional connection with their children. Furthermore, substance-using mothers show challenges in structuring, being less inclined to provide adequate scaffolding and guidance during teaching interactions, with hurdles in offering clear suggestions, and limited use of praise and encouragement (Blackwell et al., 1999). These maternal behaviors seem to directly affect children's later cognitive skills and learning

acquisitions (Carr & Pike, 2012; Obradović et al., 2016). Finally, mothers with SUD are reported as more intrusive, directive, and interfering with children's activities during early infancy, preschool, and school age (Bauman & Dougherty, 1983; Bauman & Levine, 1986; Frigerio et al., 2019; Rodning, Beckwith, & Howard, 1991), characteristics often linked to insecure and disorganized attachments (Swanson et al., 2000).

Even though a few studies were not in line with these results, finding minimal or no differences in quality of parenting behaviors between mothers with SUD and low-risk parents (Black, Schuler, & Nair, 1993; Goldman Fraser et al., 2010; Johnson & Rosen, 1990; Neuspiel, Hamel, Hochberg, Greene, & Campbell, 1991), most of the literature on high-risk parenting agrees on the presence of severe difficulties in multiple parental domains in this clinical population. It is suggested that these hurdles are linked to deficits in higher order mentalization abilities, especially reflective functioning, which would prevent a correct understanding of the child's signals in terms of subjective inner mental states, resulting in non-optimal maternal responses (Pajulo et al., 2008; Slade, 2005). Moreover, it has been shown that difficulties in parenting behaviors in this population are exacerbated by distal risk factors (Suchman & Luthar, 2001). Socio-demographic stressors, as being single parents or minority members living in poor conditions and with limited access to education, predicted poor parenting interactions and restrictive parenting styles in mothers in treatment for SUD (Bernstein et al., 1984; Suchman & Luthar, 2000).

To comprehend and explain the difficulties in caregiving practices, several studies indicate that complications in parenting are linked to different areas of neurophysiological, cognitive, and psychopathological functioning in the context of SUD, further supporting the need to understand the latent mechanisms underlying manifest behaviors (e.g. Håkansson et al., 2018; Kim et al., 2017). At the neural level, brain areas affected by SUD overlap with the reward networks involved in caregiving, undermining parental perceptions and responses to infants' signals and decreasing the salience of caregiving-related stimuli, finally compromising the ability to organize and modulate adequate parenting behaviors (Kim et al., 2017; Landi et al., 2011; Lowell et al., 2020; Rutherford &

Mayes, 2017; Rutherford, Williams, Moy, Mayes, & Johns, 2011). As a consequence, the perception of infant signals can be less rewarding for parents, becoming a source of stress rather than part of a mutually fulfilling system and increasing the risk to perpetrate hostile behaviors (De Carli et al., 2019; Kim et al., 2017). At the cognitive level, substance-related neuropsychological impairments additionally affect parental responses, undermining the capability to organize and perform behaviors attuned to and coherent with the stimuli perceived, and increasing the tendency to enact intrusive and abrupt behaviors (Håkansson et al., 2018; Porreca et al., 2018). Finally, in regard to psychopathology, findings highlight that the well-known presence of comorbidities in individuals with SUD (Bays, 1990; Brooks et al., 1994; Hans, 1999; Zuckerman & Brown, 1993) represents an additional risk factor for caregiving practices, further exacerbating difficulties in parenting behaviors experienced during parent-child interactions (De Palo et al., 2014; Porreca et al., 2018). For example, SUD often co-occurs with depressive symptoms (Davis et al., 2008), a clinical condition that has been extensively linked by the literature to less optimal parenting behaviors (Frigerio et al., 2019; Trapolini et al., 2008; Weissman et al., 1972) and child developmental outcomes (Tully et al., 2008; Goodman et al., 2011; Harold et al., 2011).

Despite this preliminary evidence, still little research has focused on the psychological functioning of these individuals, which could help to understand the mechanisms accounting for dysfunctional parenting practices. Additionally, different studies suggest the importance of considering the role of aspecific indexes of psychological maladjustment which, besides highlighting diminished mental health in individuals, could represent transdiagnostic risk factors for the development of more severe clinical conditions (Preece et al., 2022; Taylor & Bagby, 2000). Specifically, several studies on non-parents with SUD identified alexithymia as an important psychological construct associated with substance use and co-occurring clinical conditions, such as depression and anxiety (Haviland et al., 1988; Parolin et al., 2018). Specifically, alexithymia is defined as a disorder of affect regulation and characterized by difficulties in identifying and communicating feelings, including both their emotional and cognitive components (Sifneos, 1973).

Individuals with alexithymia fail in distinguishing feelings from bodily sensations originating from emotional activation, lack of imagination, and limited imaginative processes, and are characterized by an externally oriented cognitive style (Luminet, Vermeulen, Demaret, Taylor, & Bagby, 2006; Nemiah, Freyberger, & Sifneos, 1976; Taylor & Bagby, 2000). Alexithymia is considered a vulnerability factor for medical and psychiatric illnesses (Taylor & Bagby, 2004), because various studies found significant associations with depression and anxiety, considering both clinical and nonclinical contexts (Deno et al., 2011; Honkalampi et al., 2010). Moreover, there is a significant amount of evidence suggesting an association between alexithymia and substance abuse (Thorberg et al., 2009), with several studies reporting significant rates of alexithymic traits among both drug-dependent and alcohol-dependent individuals (Cleland et al., 2005; Farges et al., 2004; Ghalehban & Besharat, 2011; Lindsay & Ciarrochi, 2009; Oyefeso et al., 2008; Speranza et al., 2004). While rates of alexithymia in the general adult population are estimated to range between 6 and 17% (Franz et al., 2008; Hintikka et al., 2001), a recent review reported prevalence rates ranging between 30 and 49% in individuals with SUD (Cruise & Becerra, 2018).

Given that caregiving practices, especially in early infancy, are largely based on emotional and affective processes (Trevarthen, 2017; Tronick, 1989; Vanheule et al., 2007), it is suggested that alexithymia could have a significant impact in terms of parenting behaviors. Due to their difficulties in describing and identifying emotions, parents with alexithymia are more likely to experience difficulties in providing healthy emotional support to their children and in responding to them in an emotionally contingent way (Cuzzocrea et al., 2015). Most of the studies of parental alexithymia, especially in early infancy, focused on mothers (e.g. Schechter et al., 2015; Yürümez et al., 2014), and only to a less extent involved fathers (Cuzzocrea et al., 2015). Preliminary studies in non-substance-using parents highlight that mothers with higher levels of alexithymia show less sensitivity during interactions with their toddlers (Schechter et al., 2015), discouraging the expression of negative emotions and using an authoritarian communication style (Thompson, 2012). An externally oriented cognitive style might result in excessively strict adherence to social norms and moral rigidity,

lacking in adequate responsiveness (Cuzzocrea et al., 2015; Thompson, 2012). Moreover, positive associations were found between parental alexithymia and dependency-oriented control, suggesting that in the face of their difficulty in understanding their children's emotions, parents with alexithymia cannot respond based on emotional contingencies and compensate by adopting authoritarian parenting styles and imposing prohibitions or, on the opposite side, with a lack of limit-setting (Cuzzocrea et al., 2015; Thompson, 2012). This would lead to less emotional connection with their children. Furthermore, the emotional difficulties typically associated with alexithymia might result in an avoidance of the child's inner experience, task-focused interactions, and achievement-oriented psychological control (Thompson, 2012; Soenens & Vansteenkiste, 2010). This suggests that parental difficulties with interpersonal relatedness and closeness may lead to the use of specific controlling strategies (Cuzzocrea et al., 2015). Preliminary studies highlight that the effect of alexithymia on quality of parent-child relationships is observable also beyond infancy (Cuzzocrea et al., 2015; Kliewer et al., 2016) and remains even when controlling for parental psychopathology, for example depressive symptoms (Yürümez et al., 2014).

In summary, ample research on parenting has highlighted that alexithymia and SUD are associated with disruptions in parenting behaviors during infancy and later on during childhood. Moreover, research in adults has pointed out that SUD is associated with a higher incidence of alexithymia. Despite this evidence, up to our knowledge, no prior research has explored how alexithymic traits could affect quality of caregiving practices in mothers with SUD. The objective of the present study was to investigate the impact of maternal alexithymia on parenting behaviors in mothers with SUD. Specifically, we refer to the theoretical and empirical domain of Emotional Availability, which focuses on parenting considering the capacity of the parent-child dyad to create a healthy emotional connection and to share a wide range of affective expressions (Biringen et al. 2014; Biringen & Easterbrooks, 2012; Biringen & Robinson, 1991; Porreca, De Palo, & Simonelli, 2015; Saunders, Kraus, Barone, & Biringen, 2015). Given the specific focus on the emotional qualities of parenting, this approach could be particularly helpful in capturing the possible impact of

maternal alexithymia on different dimensions of parenting (i.e., sensitivity, structuring, nonintrusiveness, and nonhostility). This hypothesis seems supported by a previous study (Ahrnberg et al., 2021) carried out on a low-risk sample that already reported evidence of the associations between higher maternal alexithymic traits, lower maternal sensitivity and more hostile maternal caregiving behaviors. The focus on mothers is linked both to empirical and health policy reasons. Most of the literature on parenting behaviors in the context of SUDs and alexithymia specifically focuses on mothers and, given that this study represents the first attempt to bridge together these two fields, maintaining the focus on this primary caregiving figure could allow to develop and test more specific hypotheses, also in accordance to previous studies. On the other hand, health policies in Italy often foresee residential programs which take in charge mother-child dyads. In this sense, the focus on maternal parenting behaviors represents a specifically salient focus of investigation in order to better understand caregiving experiences to which children are exposed, especially in the perspective to implement and assess the efficacy of interventions.

In line with prior research on adults with SUD, we hypothesized that we would find high rates of alexithymia in our group of participants. Based on previous studies that focused on alexithymia and parenting, we hypothesized that alexithymia in mothers with SUD would affect 1) the possibility to create an emotional connection and to correctly perceive and appropriately respond to the child's signals (i.e., sensitivity); 2) the capacity to scaffold activities and to set firm limits (i.e., structuring); and 3) the tendency to control interactions and to interfere with ongoing activities (i.e., nonintrusiveness). Moreover, given previous studies highlighting associations between alexithymia and depressive symptoms in both normative and SUD samples (Haviland et al., 1988; Honkalampi et al., 2000), we controlled for the effect of the latter when considering the impact of alexithymia on parenting behaviors.

Methods

Participants

The study involved 60 women with a diagnosis of SUD and their children, attending a residential rehabilitative program in an Italian Therapeutic Community. The facility offers residential care to mother-child pairs in the context of maternal SUD and other severe psychiatric illness, providing a comprehensive rehabilitation program over a 2-year period. In Italy, entrance in Therapeutic Communities is usually subsequent to Juvenile Court decrees that imply mandatory intervention for the mother, in order not to lose parental responsibility. An integrated intervention program is provided to the mother-child dyad, combining both therapeutic (group, individual, and mother-child therapy) and educational strategies. The diagnosis of SUD was based on the patients' medical history and on urine toxicology. Sample characteristics are presented in Table 1.

Table 1. Sample characteristics (N = 60)

<i>Maternal characteristics</i>	
Age (years)	29.20 (7.47)
Education (years)	9.32 (2.41)
Familiar history of SUD	28 (47)
Significant losses	39 (65)
Experience of maltreatment	17 (28)
Age of the onset of drug use (years)	16.10 (2.41)
Poly drug use	50 (83)
Primary substance of abuse:	
Cocaine	5 (8)
Heroin	42 (70)
Drug related illness (e.g., hepatitis C.)	31 (52)
<i>Children characteristics</i>	
Gender (male)	30 (50)
Age (months)	19.37 (23.62)
Desired pregnancy	25 (42)
Prenatal drug exposure	46 (77)

Note. Data are given as n (%), mean (standard deviation)

Procedure

The recruitment began after the mothers entered the facility. Participation to the study was voluntary. Mothers who agreed to participate to the research signed written informed consent and underwent an assessment protocol that took place during two one-hour sessions within the first 3-4 weeks after enrollment. The assessment included measures aimed at investigating socio-demographic and clinical information, alexithymia and depression. Moreover, mother-child dyads were videotaped during 15-minute free-play sessions, in order to assess the quality of parenting behaviors.

The research protocol was approved by Institutional board and carried out in accordance with the Declaration of Helsinki.

Measures

Alexithymia

Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994; Bressi et al., 1996). To investigate the presence of alexithymia, the mothers were administered the 20-items TAS-20. Each item is scored on a 5-point Likert scale and can be grouped into three subscales representing the main factors of alexithymia: Difficulty in identifying feelings, Difficulty in describing feelings, and Externally oriented thinking. The scoring system also provides a Total alexithymia Score according to which each individual can be identified as non-alexithymic, borderline, or alexithymic with respect to cut-off values (<51, 52-60, and >61 respectively). The instrument has been previously validated in samples of substance abusers, resulting in a reliable and valid measure of the construct (Haviland et al., 1994). According to previous research (see Yürümez et al., 2014), for the purpose of the present study the participants were divided into two groups according to the Total alexithymia score ($\alpha=.725$): mothers with and without alexithymia, with a Total TAS score higher/lower than 51 respectively.

Depression

Symptom Checklist-90 Revised (SCL-90-R, Derogatis, 1994; Sarno, Preti, Prunas, & Madeddu, 2011).

The presence of depressive symptoms in the mothers was investigated through the 13-item Depression scale of the SCL-90-R, a self-report questionnaire aimed at evaluating the presence of psychological distress and a wide range of psychopathological symptoms in clinical and non-clinical populations. Raw scores are converted into T-scores that are compared to norms and that aid the identification of clinically severe symptoms.

Parenting behaviors

Emotional Availability Scales (EAS cales, Biringen, 2008). Mothers with SUD and their children were videotaped while interacting together during a 15-min free-play condition with a standardized set of toys. Quality of parenting behaviors was coded according to the fourth version of EAS which considers four maternal dimensions: sensitivity, structuring, nonintrusiveness, and nonhostility.

Sensitivity considers adult's affects, perception and responsiveness to child's signals, awareness of timing, flexibility, variety, and creativity during interactions, acceptance of the child, amount of interaction, and handling of conflict situations.

Structuring refers to the adult's ability to offer successful guidance with the right amount, integrating both verbal and nonverbal channels of structuring, limit setting, remaining firm in front of child's pressure, and maintaining an adult role.

Nonintrusiveness considers the parent's ability to follow the child's lead, the adoption of optimal ports of entry into interaction, the use of commands, directives, and didactic teaching, quality of adult talking, the presence of verbal and physical interferences, and the child's reactions to adult's behaviors.

Nonhostility refers to the regulation of negative affects, to the absence of mocking and disrespectful behaviors towards the child, to the lack of threats of separation and of frightening behaviors, to the ability to show composure during stressful situations, and to the absence of silences and hostile play themes during interactions.

The coding system can be applied from infancy to adolescence and considers the global quality of the interaction observed rather than discrete behaviors. Each scale is rated on a global score, ranging from 1 to 7 with higher scores referring to more functional behaviors; specifically, scores between 5.5 and 7 are considered functional, scores around 4 indicate inconsistency, and scores of 3 or below refer to more difficult/problematic behaviors. For the purposes of the present work, we adopted the score 4 to distinguish between parenting behaviors at risk (EAS scores ≤ 4) and non-at-risk (EAS scores > 4). The instrument has shown good psychometric properties both in normative and clinical populations, proving to be a valid and sensitive measure of parenting and of relational dyadic affective quality (Biringen et al., 2014). For the purpose of the present study the videos were coded by two independent raters reliable to the system. Inter-rater reliability was calculated using Intraclass Correlation Coefficients on a randomly selected subsample of 20% of the cases, with values ranging from 0.80 to 0.95.

Statistical Analyses

First, descriptive statistics were run on the data, in order to examine mean scores, frequencies, and percentages. Secondly, the total sample of mother-child dyads was split into two groups depending on mothers' alexithymia scores, resulting in a group with maternal alexithymia and a group without maternal alexithymia. Distributions of the parental behaviors that scored below 4 in each of the EAS scales were reported in the total sample as well as in the two groups, with or without alexithymia. Logistic regressions were used to test whether alexithymic mothers were more at risk for at risk parenting behaviors or not. Differences between alexithymic and non-alexithymic mothers were then assessed on the EAS expressed in their continuous form, as well as other relevant variables. T tests were used for the continuous variables (i.e., child's and mother's age) and logistic regressions for the dichotomous variables (child's sex and maternal depression SCL score above the clinical cut-off). Thus, the differences in the EAS between alexithymic and non-alexithymic mothers were controlled for potentially confounding variables, by means of linear regressions. In a first step, maternal

alexithymia, mother's and child's age were listed as predictors and in a second step also the depression subscale of SCL was added to the model, since the known overlap between TAS-20 and depressive symptomatology. In addition, in supplementary materials, we provide also the same regression models controlling for global psychopathology and anxious symptomatology. Finally, in supplementary materials, we provide also a correlation table between the continuous variables used in the study (i.e., maternal alexithymia, mother's and child's age, depressive symptomatology and the EAS).

Results

The results highlighted that 43% of the mothers reached thresholds for the presence of alexithymia. Table 2 presents the distribution of parental behaviors at risk within the full sample of the study and in the groups of mothers with or without alexithymia. All the EAS, except for Nonhostility, show scores below 4 and therefore can be considered at risk, both in the global sample and in the two groups. Structuring scores show difference in distribution between groups, since more at risk behaviors are shown by the mothers with alexithymia. No significant differences were found for the other scales.

Table 2. Distribution of the parental behaviors at risk within the sample

	Parenting behaviors at risk (EAS scores \leq 4)			OR
	Total (n = 60)	Mothers without alexithymia (n = 34)	Mothers with alexithymia (n = 26)	
Sensitivity	47 (78)	25 (74)	22 (85)	1.96
Nonhostility	14 (23)	5 (15)	9 (35)	3.01
Structuring	40 (67)	19 (56)	21 (81)	2.30*
Nonintrusiveness	40 (67)	20 (59)	20 (77)	3.30

Note. Data are given as n (%).

* $p < .05$

OR = Odd Ratio resulted from Fisher's Exact Test

Table 3 presents the differences between groups in the main variables of the study. Mothers in the alexithymic group present higher odds for dysfunctional structuring behaviors, while Sensitivity as

well as children's age present lower scores in the alexithymic group that show only a trend toward significance. Depression symptomatology is also more likely in the alexithymic mothers.

Table 3. Group differences in the variables of the study

	Mothers without alexithymia (n = 34)	Mothers with alexithymia (n = 26)	β	Ω_0^2
Sensitivity	4.19 (0.80)	3.85 (0.60)	-0.24 [†]	0.04
Nonhostility	5.38 (1.08)	4.96 (1.03)	-0.14	0.01
Structuring	4.46 (0.73)	4.04 (0.56)	-0.30*	0.07
Nonintrusiveness	4.19 (1.33)	3.83 (1.17)	-0.20	0.02
Child's Age	19.82 (26.69)	18.77 (19.36)	0.21 [†]	0.03
Mother's Age	29.74 (7.82)	28.50 (7.07)	0.06	0.01
				OR
Depression Symptomatology	7 (21)	10 (38)		4.83**
Child's Gender (male)	17 (50)	13 (50)		1

Note. Data are given as n (%), mean (standard deviation)

[†]p < .1; * p < .05; ** p < .01

OR = Odd Ratio resulted from Fisher's Exact Test

Ω_0^2 = Partial Omega Squared

Then we tested the effect of alexithymia groups on each EA Scale, controlling for the potential confounding role of mothers' and children's age. Results are presented in Table 4, where we also tested the effect of depression in order to determine whether the alexithymia effect was specific, in light of the known overlap between the two constructs. Results show that controlling for mothers' and children's age, both Sensitivity and Structuring are predicted by the presence of alexithymia, but only the effect on Structuring survives to the effect of depression symptomatology. Results remain substantially unaltered when we controlled for other SCL symptomatology scales over the clinical cutoff, such as anxiety and the Global Severity Index (results of the regression models are presented in Table 2a and Table 3a in the appendix).

Finally, for sake of completeness, we report also the results of the correlations between the continuous variables in the appendix (Table 1a). The EAS scales resulted non-significantly associated with alexithymia. Only the Nonintrusiveness scale was positively correlated with both child's and mother's age, while only Sensitivity scale was negatively associated with depression symptomatology. Alexithymia and depression showed a positive correlation.

Table 4. Effect of Alexithymia and Depression on Mother's Emotional Availability Scales

Predictors	Emotional Availability Scales - Mother															
	Sensitivity				Nonhostility				Structuring				Nonintrusiveness			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	β	Ω_0^2	β	Ω_0^2	β	Ω_0^2	β	Ω_0^2	β	Ω_0^2	β	Ω_0^2	β	Ω_0^2	β	Ω_0^2
Alexithymia	-0.25*	0.04	-0.19	0.04	-0.19	0.02	-0.16	0.02	-0.32*	0.07	-0.35*	0.07	-0.12	0.01	-0.10	0.01
Child's Age	0.18	-0.01	-0.15	0.02	-0.25 [†]	0.03	-0.09	-0.01	-0.08	0.01	0.08	-0.02	0.35**	0.17	-0.03	-0.01
Mother's Age	-0.27 [†]	0.05	0.17	-0.01	0.12	0.00	-0.26 [†]	0.02	-0.19	0.01	-0.07	0.01	0.22 [†]	0.03	0.35**	0.17
SCL - Depression			-0.23	0.03			0.15	0.00			-0.21	0.02			0.23	0.03
R ²	0.12 [†]		0.14 [†]		0.10 [†]		0.10 [†]		0.14*		0.15 [†]		0.25**		0.25**	
AIC	134.06		134.73		181.52		183.10		125.73		127.35		190.27		192.21	
Model Comparison	$F(1,55) = 1.23, p = .27$				$F(1,55) = 0.38, p = .54$				$F(1,55) = 0.35, p = .55$				$F(1,55) = 0.06, p = .80$			

[†]p < .1; * p < .05; ** p < .01; *** p < .001;

Ω_0^2 = Partial Omega Squared

Discussion

The objective of the present study was to investigate the impact of maternal alexithymia on parenting behaviors in mothers with SUD, a high-risk condition both for caregiving and for child development (Hans & Jeremy, 2001; Parolin & Simonelli, 2016). Although several studies reported a high incidence of alexithymic traits in individuals with substance abuse and dependence (Cleland et al., 2005; Speranza et al., 2004; Thorberg et al., 2009), no previous research has investigated this aspect with respect to the specific domain of parenting.

As expected, we found the dyads in our sample to show relatively low-quality parenting behaviors, mostly characterized by inconsistency, incoherence, and other difficulties, such as detachment and unpredictability, in most of the domains considered. The range of scores we found on the EA Scales was consistent with other studies on parents with SUD (Frigerio et al., 2019; Salo et al., 2009), and it was systematically lower than what is typically found in normative, low-risk samples (e.g., Licata, Kristen, & Sodian, 2016). Although some studies did not report the presence of interactive difficulties within this population (Black et al., 1993; Johnson & Rosen, 1990; Neuspiel et al., 1991), the mothers in our sample presented low sensitivity and structuring, as well as high intrusiveness when interacting with their children. These characteristics have been previously linked to more severe forms of dysfunctional caregiving practices in the parent, such as harsh discipline or even maltreatment (e.g., Bauer & Twentyman, 1985; Joosen, Mesman, Bakermans-Kranenburg, & van IJzendoorn, 2012), as well as undesired developmental outcomes in children (Swanson et al., 2000), providing evidence of the detrimental effect that prolonged substance abuse can have on parental practices (Johnson et al., 1990).

Differently from previous studies (Fitzgerald et al., 1990; Pajulo et al., 2001), our data did not highlight particular difficulties in the parental domain of negative emotion regulation (i.e., the nonhostility scale). It is possible that the context of free play in which observations were conducted

was not stressful enough to elicit plainly hostile behaviors. Another explanation could be that admission to treatment could have buffered more severe forms of difficulties (Fraser et al., 2010).

With respect to alexithymia, as expected, 43% of the mothers in our study presented scores above the TAS-20 cutoff, confirming the high prevalence of this trait in SUD individuals also in the context of motherhood. Several studies indicate alexithymia to be a common trait in adult and young substance abusers (Handelsman et al., 2000; Oyefeso, Brown, Chiang, & Clancy, 2008; Parolin et al., 2018; Torrado, Ouakinin, & Bacelar-Nicolau, 2013), suggesting that it could be a potential risk and sustaining factor for SUD (De Rick & Vanheule, 2006; de Timary et al., 2008). Specifically, it has been hypothesized that in the case of alexithymic traits, the assumption of substances could be used to compensate for deficits in emotional self-awareness (Taylor et al., 1997). At the same time, various studies have pointed out associations between alexithymia and quality of parenting in infancy (Schechter et al., 2015), childhood (Yürümez et al., 2014), and adolescence (Cuzzocrea et al., 2015; Kliewer et al., 2016), suggesting that it can be an additional risk factor for adequate caregiving in parents with SUD. Differently from what expected, our first hypothesis on the associations between maternal alexithymia and maternal sensitivity was only partially confirmed suggesting that, in our group, difficulties in becoming aware of one's own emotions had only a marginal impact on the ability to affectively attune to children's emotional signals and to create a healthy and emotional connection with them. It is possible that this lack of significant associations is linked to methodological characteristics, as for example sampling procedures or the conceptualization of maternal sensitivity provided by the EAS, which take into specific account the emotional climate of parent-child interactions rather than discrete parenting behaviors or self-reported parenting attitudes per se. On the other hand, we might wonder whether parental sensitivity as measured by the EAS could be more linked to parental psychopathological characteristics which are different from maternal alexithymia, as for example depression, as highlighted by the results of our study and by previous research (Trapolini et al., 2008).

On the contrary, in line with our second hypothesis, the mothers in our study who reported the presence of alexithymia presented with significantly lower scores on structuring supporting the expectation that in this clinical group, the presence of alexithymia is associated with difficulties in guiding, scaffolding activities and setting age appropriate limits.

The impact of maternal alexithymia on structuring remained even when controlling for depression (as well as mothers' and children's age), suggesting that the difficulties in becoming aware of one's own feelings could play a specific role in the ability to guide and scaffold interactions in an emotionally attuned way and to subsequently set age-appropriate limits. This result is in line with previous work that suggests a specific effect of alexithymia on parenting, also accounting for maternal psychopathology (Yürümez et al., 2014), and partially extends these results to a SUD clinical sample. Anyway, it seems that besides the partial overlapping between depression and alexithymia, both in terms of psychopathology and of their effect on caregiving, the role of the latter seems specific for the parental domain of structuring rather than other parental characteristics. In the EA frame, adult structuring refers to the ability of the caregiver to support the child's activities and autonomy through guidance, scaffolding, and mentorship (Clark et al., 2021). Anyway, appropriate structuring refers not only to the provision of a sufficient amount of suggestions and of guidance but also to its quality, which should be proactive and emotionally attuned to the child's age, condition, and level of understanding, and also provided through an integration of different channels to be effective (Biringen, 2008; Sullivan & Horowitz, 1983). In other words, to properly guide and scaffold a child's abilities, the parent's suggestions should be advanced with the right timing, when the child is ready or prepared to pick them up, and through different verbal and nonverbal modalities to be understandable and to act within the child's zone of proximal development (Carr & Pike, 2012). In this, structuring and sensitivity can be very highly related at times, although they capture different dimensions of adult behavior (Biringen et al., 2014). Previous studies highlighted that substance-using mothers show difficulties providing adequate guidance during teaching interactions with their children (Blackwell et al., 1999). It is possible that when SUD co-occurs with alexithymia, parents

experience additional difficulties in understanding when their suggestions are contingent on the child's level of comprehension and thereby fail to provide adequate structuring, resulting in a series of attempts that could be too much (i.e., over-structuring), too little (i.e., under-structuring), or incoherent with respect to the child's needs (Meins, 1997). At the same time, as previously reported in studies on parents without SUD (Cuzzocrea et al., 2015), it is possible that parents with alexithymia attempt to compensate for the lack of emotional understanding with a lack in limit-setting. These results seem to support studies pointing out deficits in parents' higher order mentalizing abilities after extended substance use, which would prevent the possibility to assume the children's perspective, understanding their experience in terms of mental states, and subsequently failing to organize and modulate appropriate scaffolding responses (Håkansson et al., 2018b; Pajulo et al., 2008). Notably, these abilities and other processes involved in the understanding of others' inner emotional experiences, have shown correlations with maternal emotional availability (Möller et al., 2017) and have been found to be further damaged by the presence of alexithymia (Moriguchi et al., 2006; Sonnby-Borgström, 2009). At the same time, this result is in line with previous literature using the EAS that highlighted an important role of parental structuring in shaping the quality of adult (Biringen et al., 2000; Lehman et al., 2010; Levesque et al., 2015) or child (Lecompte et al., 2020; Venuti et al., 2008) characteristics, supporting the importance to include different parental domains when addressing caregiving quality.

Finally, differently from what we expected from our third and fourth hypotheses, we did not find associations between alexithymia, nonintrusiveness (i.e., the tendency to avoid controlling and intruding into interactions), and nonhostility (i.e. the difficulty in regulating negative emotions). These results suggest that, at least in the case of maternal SUD, the tendency to interfere and to exhibit covert or overt hostility could be linked to other mechanisms, possibly more dependent on neuropsychological functioning and self-regulation abilities (Porreca et al., 2018).

A final consideration should be addressed to the fact that we found significant differences in parenting behaviors when considering alexithymia a dichotomous variable (i.e., parents with vs.

without alexithymia) rather than a continuous one. Although the choice to dichotomize the construct relied on previous work in which this procedure proved to be effective in explaining the relationships between parenting and alexithymia (see Yürümez et al., 2014), it is noteworthy that in our study these two domains presented only a tendency toward a linear relation, which was clearly evident in studies on normative parents (e.g., Cuzzocrea et al., 2015). Some authors suggest being careful in dichotomizing variables during statistical analyses (e.g., MacCallum, Zhang, Preacher, & Rucker, 2002), whereas other authors state that the adoption of this procedure in clinical psychology and psychiatry could be particularly helpful (e.g., Farrington & Loeber, 2000; Flouri, 2008). Specifically, in this field, dichotomization, which helps to identify extreme categories, could help to reveal a specific clinical phenomenon and its effects, which could be otherwise concealed by product-moment correlations between continuous variables (Farrington & Loeber, 2000). Future studies should further investigate this issue in the field of at-risk parenting to understand whether this aspect could be linked to methodological limits in the measures and analyses adopted or rather to the specific clinical condition of the group considered.

Taken together, these data indicate that the presence of alexithymia in parents with SUD is more likely to lead to incoherent or withdrawn patterns of dysfunctional caregiving that in their most extreme form might result in the complete absence of scaffolding, or even in child neglect, rather than in physically abusive behaviors.

The study presents a series of limitations. First, it is characterized by a relatively small (albeit clinical) sample. The adoption of a larger sample in the future would provide more information on the phenomenon of parental alexithymia and its implications for caregiving behaviors in the context of parental SUD. A second limitation of the study is linked to the absence of a control group, the adoption of which in the future could help to understand whether the mechanisms linking presence of alexithymia and low levels of structuring in parenting behaviors are generalizable to all parents or are specific to parents with SUD. A third limitation concerns the use of a self-report measure to assess alexithymia. Although the results of the present study showed excellent reliability with respect to the

TAS-20 total score, and previous literature effectively adopted the instrument with similar research designs (Cuzzocrea et al., 2015; Schechter et al., 2015; Yürümez et al., 2014), it could be critical for an individual with alexithymia, which per definition presents difficulties in acknowledging and describing his or her own emotional states, to accurately describe his or her alexithymic symptoms. Therefore, the adoption of multi-informant assessments in future studies would provide a better and more global understanding of the phenomenon. A fourth limitation concerns the heterogeneity of children's age, which we tried to compensate for by adopting an instrument (the EA Scales) that allowed us to assess parenting from infancy to adolescence and controlling for children's age in statistical analysis. Finally, a limitation is represented by the lack of measures specifically aimed at investigating maternal mentalizing abilities, as reflective functioning, which could be particularly important in the context of SUD. In our study this aspect was captured only to some extent through the EA coding system and, thus, should be further investigated in future research, to better understand how maternal alexithymia could affect the psychological mechanisms that allow parents to get in touch with their children's inner experiences and feelings.

Clinical implications

Despite the limitations, the results of this study provide a series of clinical implications with respect to the implementation of assessment and intervention strategies for parents with SUD. As previously highlighted, parental SUD is a complex clinical condition in which various medical, social, psychological, and relational-behavioral characteristics are involved. The results of this study stress the importance of simultaneously investigating parenting behaviors and individual psychopathological characteristics in the parent, such as alexithymia. As our results highlight, the sample of mothers considered presents general difficulties in almost all domains of parenting behaviors, but when alexithymia is clinically present, caregiving difficulties seem to specifically involve structuring. In this sense, future assessment protocols should try to go beyond the simple identification of challenges in parenting behaviors to understand whether specific difficulties could

be better understood by also considering specific psychopathological traits in the parent. This attempt could have important implications for clinical treatment. In the context of high-risk parenting, as in the case of parental SUD, one of the main targets of interventions is represented by highly severe behaviors, such as hostility and intrusiveness, which could be contingently linked to undesired outcomes such as maltreatment and disorganized attachment in the child (Swanson et al., 2000). The results of the present study stress the importance of considering and intervening also in more subtle and less “evident” parenting behaviors, offering support for a wider range of parental strategies in the context of parental SUD. In the specific case of alexithymia, particular attention should be addressed to the possibility of providing parents with effective strategies to structure and scaffold their children’s activities, and to provide adequate and understandable limits where necessary.

In conclusion, this is the first study to investigate the impact of maternal alexithymia on quality of caregiving in mothers with SUD, highlighting a specific effect of the first on the parental domain of structuring, even after controlling for psychopathology. Future studies could explore the origins of these alexithymic traits in SUD parents, determining whether they are associated with mothers’ past traumatic experiences (De Carli et al., 2017) or more directly related to drug assumption. Finally, research should focus on testing whether these associations could represent pathways toward more severe forms of parental difficulties (e.g., maltreatment in the form of neglect) and whether they could be sensitive to interventions.

Chapter 4

Impact of cognitive functioning and psychopathology on parenting behaviors in mothers with Substance Use Disorder: A 15-months longitudinal study

Chapter 4: Porreca, A., De Carli, P., Filippi, B., Parolin, M., Simonelli, A. (in preparation).
Impact of cognitive functioning and psychopathology on parenting behaviors in mothers with
Substance Use Disorder: A 15-months longitudinal study

Abstract

In this chapter we present a study examining the role of psychopathology and cognitive functioning on the ongoing of parent-child relationships in mothers with SUD during 15 months of treatment. The study involved 60 women in residential treatment for SUD and their children. At admission the participants were assessed with respect to psychopathology and cognitive functioning. Quality of parent-child relationship was measured at admission and every three months for the following 15 months of treatment. The results showed a significant negative main effect of maternal psychopathology and significant interactions between both the linear and quadratic effects of time and the cognitive functioning scores. For low levels of cognitive functioning (i.e., 1 SD below the mean), the quadratic effect of time was significant and negative ($b = -0.95$, $SE = 0.47$, $t = -2.02$, $p = .04$), while for high levels of cognitive functioning the quadratic effect of time was significant and positive ($b = 1.09$, $SE = 0.46$, $t = 2.37$, $p = .02$). These data support the highlight that maternal psychopathology and cognitive functioning could have a role in the treatment of parenting behaviors. Limitations and implications of the results are discussed.

Introduction

Maternal Substance Use Disorder (SUD) constitutes a major public health problem that affects both users and their families, especially children (Messina et al., 2015). Offspring of mothers with SUD are at higher risk to be exposed to maladaptive parenting practices, that can result in the extremes of abuse and neglect (Peleg-Oren & Teichman, 2006). Prenatal substance exposure represents one of the first stages of child maladaptive care (Eyler & Behnke, 1999; Hagan et al., 2016). Infants exposed to substances in utero are at higher risk to present unfavorable physical and autonomic manifestations at delivery, as reduced growth measures, withdrawal symptoms, increased irritability and feeding difficulties (Behnke & Smith, 2013; LaGasse, 2003). Later on, these children are at higher risk to show the presence of cognitive, linguistic, and physical delay (Behnke & Smith, 2013; Lewis et al., 2004). At the same time, children of parents with SUD are at higher risk to manifest emotional problems, as social withdrawal, depression, and anxiety, or behavioral difficulties, as aggressiveness, delinquency, and substance use throughout childhood and adolescence (Bada et al., 2007; Kilpatrick et al., 2000; Minnes et al., 2014). The severity and nature of these manifestations depend on the type of substance of abuse as well as on the frequency and the duration of use (Messina et al., 2015).

Along with the physical effects of substance exposure, one of the main difficulties is represented by parenting practices and the care of children subsequent to the reiterated consumption of substances in the home, after pregnancy (Bada et al., 2007; Spehr et al., 2017). In their extreme forms, parental maladaptive practices can take the form of abuse or neglect, where the parent fails to take care of the child's basic needs, as providing a secure and clean environment, feeding and clothing (Barnard & McKeganey, 2004). Child neglect represents one of the most common reason for involvement with child welfare services, which in many cases are followed by child removal from home (Dakof et al., 2010). Separations are frequent also due to the legal issues annexed to substance dependence and to drug trade, which at times lead to parental incarcerations (KMiller, 2006). On the other hand, children of parents with SUD are at increased risk to experience different forms of abuse,

as for example severe forms of assault to their self-esteem (Kienberger et al., 1995; Windham et al., 2004).

Besides these extreme forms of dysfunctional care, a wide array of literature highlights that improper parenting practices in mothers with SUD can take the form of more subtle difficulties that occur during everyday life caregiver-child interactions, insidiously undermining quality of care and child development (Tronick et al., 2005). As a group, mothers with SUD tend to be less sensitive and responsive to children's emotional signals (Eiden, 2001; Flykt et al., 2012; Frigerio et al., 2019; Porreca et al., 2016; Salo et al., 2009, 2010). During play interactions they are more inclined to be directive and interfering with offspring activities, presenting hurdles in the regulation of negative emotion and in the possibility to experience mutually rewarding exchanges with their children (Bauman & Levine, 1986; Rodning, Beckwith, & Howard, 1991; Fitzgerald, Kaltenbach, & Finnegan, 1990; Johnson et al., 2002; Pajulo et al., 2001). These negative parenting behaviors have been observed also during feeding interactions (LaGasse, 2003; Minnes et al., 2005) and have been linked to a higher risk to be involved with child protective services (Matos et al., 2014), as well to unfavorable outcomes in offspring, as insecure and disorganized attachments (Swanson et al., 2000). Moreover, parenting difficulties have been observed also during disciplinary situations, with mothers with SUD being more inclined to adopt harsh limit-setting strategies in response to child's problematic behaviors (Miner & Clarke-Stewart, 2008; Thompson Gershoff, 2000). These practices tend to be ineffective and are related to several undesired developmental sequelae in children, including internalizing and externalizing disturbances (Bada et al., 2007; D'Onofrio et al., 2007; Misri et al., 2006).

On the child's side, the neurodevelopmental and emotional characteristics associated to gestational substance exposure are likely to further exacerbate quality of parent-child relationships (O'Connor et al., 2002). Prenatal drug assumption is linked to higher irritability, increased levels of activity, autonomic instability, low levels of arousal as well as disturbances in sleep patterns in infants (Coles & Platzman, 1993; Eiden et al., 2011; Mattson et al., 2001). These features tend to persist

throughout toddlerhood and during the preschool period, undermining the readability of child signals and, subsequently, parental responses (Behnke & Smith, 2013; O'Connor et al., 2002). As a consequence of negative transactional patterns between parent and child traits, offspring of caregivers with SUD are at higher risk of being exposed to low quality attachment relationships across a wide span of situations and ages (Frigerio et al., 2019; LaGasse, 2003; Thompson Gershoff, 2000).

Little research has provided information about the “normative” ongoing of mother-child relationships over time in the context of SUD, whereas the majority of extant work presented cross-sectional data. Previous longitudinal studies (Blackwell et al., 1999) showed that, without the support of appropriate and focused interventions, difficulties in mother-child exchanges tend to persist over the course of the first years of life. Specifically, within these dyads only children seem to show gains in their emotional competencies, albeit their scores tend to remain low compared to low-risk and other high-risk groups (Blackwell et al., 1999).

On the other hand, a growing body of literature points out that, when appropriately addressed through targeted interventions, quality of parent-child relationships in this clinical group can effectively be improved (Belt et al., 2012; Suchman et al., 2012). Specifically, early and preventive interventions are identified as a fundamental window for providing effective treatment in the condition of SUD, preventing infants' physical and emotional problems (Belt et al., 2012; Howell et al., 1999; Niccols et al., 2012). For example, psychodynamic group therapy was found effective in reducing hostile and intrusive behaviors towards children (Belt et al., 2012), whereas attachment and mentalization-based interventions supported the improvement of relationship quality, enhancing maternal mentalizing abilities (Pajulo et al., 2012; Suchman et al., 2011). These interventions favored an improvement in parent-child relationships, enhancing maternal and child involvement (Belt et al., 2012; Suchman, DeCoste, Castiglioni, et al., 2010). The results of these studies suggest the persistence of positive outcomes in time (Smith et al., 2010; Suchman, DeCoste, Leigh, et al., 2010).

Given the complexity of SUD, different authors point out to the need to identify mechanisms that support or obstacle intervention effect in this clinical context, especially in the condition of parenthood (Belt et al., 2012; Bosk et al., 2019; Suchman et al., 2012). Concerning this, some authors focused on the presence of psychopathology, which often tend to co-occur with substance misuse (Dixon et al., 2018; Salloum & Brown, 2017; Swendsen, 2000; Yilmaz & Dilbaz, 2016). The presence of additional symptoms of psychopathology constitutes an adjunct risk factor for caregiving practices, further exacerbating difficulties in parental responses and quality of parent-child relationships (De Palo et al., 2014; Hans, 1999; Porreca et al., 2018; Zuckerman & Brown, 1993). The co-occurrence of substance misuse and severe psychological distress has a negative impact on treatment response, leading to a higher risk of poor outcomes and treatment dropout (Herbeck et al., 2005). This association was found for several psychiatric disorders, including depression, somatization, hostility, generalized anxiety disorder, PTSD (Elmquist et al., 2016; Petry & Bickel, 2000; Strantz & Welch, 2012; Williams & Roberts, 2009; Zweben et al., 2012) and dysfunctional personality traits (Fernandez-Montalvo & López-Goñi, 2010). Similar findings were found on studies that have focused on drug dependent women and pregnant women, where severity of psychopathology was related to higher rates of treatment dropout (Haller & Miles, 2008; Howell et al., 1999).

Other studies examined the role of cognitive functioning, given the strong associations between chronic use of drugs and brain structural and functional changes, especially in the prefrontal area (Ray Lia, & Sinha, 2008; Cummings, 1995; Goldman-Rakic, 1987; Luria, 1973). These regions are responsible for the cognitive and self-regulatory processes grouped under the domain of executive functioning, a set of neurocognitive skills involved in goal-directed problem solving (Diamond, 2013; Zelazo, Müller, Frye, & Marcovitch, 2003). Impairments in executive functioning have been found to be one of the most common risk factors for treatment abandonment (Brorson et al., 2013; Teichner et al., 2002), distinguishing between completers and dropouts (Aharonovich et al., 2006). Moreover, cognitive functioning has been identified as one of the positive indexes of effective treatment, with significant improvements in executive performances after treatment completion (Vergara-Moragues

et al., 2017). Notably, recent research provided evidence for the role of cognitive functioning for adequate parenting practices (Deater-Deckard, Wang, et al., 2012). Adequate cognitive resources, especially in the domain of executive functioning, allow parents to regulate their emotions and goals, and to integrate them into specific behavioral plans of action (Dix, 2000; Shaffer & Obradović, 2017). Being able to rely on efficient cognitive processes enable parents to modulate negative emotions and to successfully cope with challenging parent-child interactions (Deater-Deckard, Wang, et al., 2012). These cognitive mechanisms have shown impairments in parents with SUD, predicting poor quality parent-child relationships (Porreca et al., 2018).

Additionally, cognitive functioning presented relevant links with psychopathology, exhibiting associations with symptoms of depression (Taylor-Tavares et al., 2007), obsessive compulsive disorders (Penades et al., 2007), and psychotic disorders (Barch, 2005). Thus, in the condition of SUD psychopathology and cognitive impairments might coexist, with the risk to aggravate parenting quality and the course of treatment. Thus, a better comprehension of the mechanisms underlying maladaptive parenting practices and affecting treatments provided to parents with SUD is necessary, in order to be able to timely intervene and to mitigate the negative impact that the side effects of substance misuse could have on children developmental outcomes. Although different studies focused on the impact of psychopathology (Herbeck et al., 2005) and cognitive functioning (Brorson et al., 2013; Teichner et al., 2002) in treatments addressed to adults with SUD, little is known about how these mechanisms intervene in the specific context of parenthood. Some studies provided an evidence of the role of psychopathological symptoms in interventions provided to mothers with SUD (Haller & Miles, 2008; Howell et al., 1999; Suchman et al., 2012). Anyway, as far as we know no study considered the role of cognitive functioning in intervention effects on mothers with SUD. This aspect could be of particular importance given that limited cognitive processes could reduce the resources dedicated to both parental demands and treatment requirements. In order to fill the gaps in the literature, the present study aims to investigate the role of psychopathological distress (Objective 1) and of cognitive functioning (Objective 2) on quality of parent-child relationship during a

residential treatment program for mothers with SUD. For the purpose of the present study we will adopt an observational longitudinal study, that will allow an understanding of the degree and direction of change in parent-child relationship over time (Caruana et al., 2015). Psychopathology and cognitive functioning will be used as independent variables, whereas quality of parent-child relationship will be adopted as dependent outcome. According to previous literature (Brorson et al., 2013; Suchman et al., 2012; Teichner et al., 2002), we expect to find a significant effect of parental psychopathological distress (H1) and cognitive functioning (H2) on changes of quality of parent-child relationship over time. Moreover, we expect to find a significant interaction between these two adult dimensions in shaping the longitudinal ongoing of our outcome variable (H3).

Methods

Participants

The study involved 60 mothers with SUD (mean age = 30.13 years; SD = 6.9) and their children (48% male, mean age = 17.17 months; SD= 23.6) attending a residential treatment for substance misuse. The participants were recruited at the beginning of the program. The facility offers a psychodynamic-oriented comprehensive which includes pharmacological, educational and psychological intervention, and parenting counselling as described in Stocco and colleagues (2012). Educational intervention is provided on a daily basis. Psychological intervention is provided through individual psychotherapy (1 session per week) and group psychotherapy (1 session per week). Sessions of parenting counselling are available for mothers on request but are not mandatory. The diagnosis of SUD was based on the patients' medical history and on urine toxicology. Sample characteristics are presented in Table 1. As it is possible to observe, most of them presented an early onset (M = 18.22; SD = 3.34) and a pattern of poly-drug use (86%), with heroin as primary substance of use (73%). Most of the children were exposed to substances in utero (83%). In most cases (78%), the mothers' entrance to the facility was mandatory, after a Juvenile Court Decree. The participants were enrolled

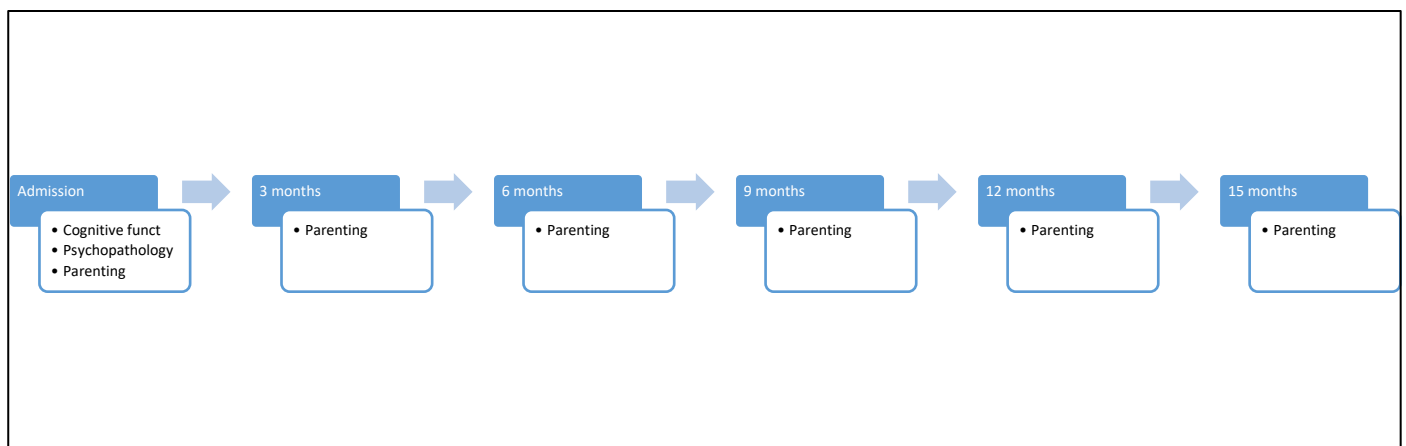
in the study after their admission to the facility. Mothers interested to take part to the study received more information and were administered written informed consent. Information inherent socio-demographic and clinical variables, maternal cognitive functioning, and psychopathological symptoms was collected at enrollment. Parenting behaviors and quality of parent-child interactions were assessed at enrollment and every 3 months during the following 15 months of treatment. Figure 1 displays the phases of the study.

Table 1. Demographic characteristics of the sample

Maternal Characteristics	
Age (years)	30.13 (6.9)
Education (years)	9.71 (2.41)
Familiar history of SUD	27 (47)
Significant losses	36 (68)
Experience of maltreatment	41 (68)
Age of the onset of drug use (years)	18.22 (3.34)
Poly drug use	50 (86)
Primary substance of abuse:	
Cocaine	6 (10)
Heroin	43 (73)
Drug related illness (e.g., hepatitis C.)	33 (55)
Children's characteristics	
Gender (male)	29(48)
Age (months)	17.17 (23.6)
Desired pregnancy	28 (47)
Prenatal drug exposure	50 (83)

Note. Data are given as n (%), mean (standard deviation)

Figure 1 – Phases of the study



Measures

Quality of parenting behaviors and of parent-child interactions

Mothers and children underwent 15-minutes videotaped free-play episodes that were subsequently assessed by trained coders. The procedure was carried out at admission and repeated every 3 months, during the first 15 months of treatment, for a total of 6 measurements. Quality of parenting behaviors and of mother-child interactions was measured through the Emotional Availability Scales—4th ed. (EAS; Biringen, 2008). The coding system includes six scales aimed at assessing parenting behaviors (*sensitivity, structuring, nonintrusiveness, and nonhostility*) and child interactive behaviors (*responsiveness and involvement*) during structured or non-structured interactions. Each scale is rated on a 7-point Likert scale, with higher scores referring to more functional aspects. For the present study the videos were coded by two independent raters reliable to the system. Inter-rater reliability was calculated using Intraclass Correlation Coefficients on a randomly selected subsample of 20% of the cases, with values ranging from 0.80 to 0.95. For the purposes of the present study, a composite measure was computed as an index of the global quality of parent-child relationship.

Maternal psychopathological symptoms

Maternal psychopathological symptoms were measured at admission through the Symptom Checklist-90 Revised (SCL-90-R; Derogatis, 1994; Sarno et al., 2011), a self-report questionnaire aimed at assessing the presence of psychopathological symptoms on nine primary symptom dimensions (*somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism*) and psychological distress according to three global distress indexes (*Global Severity Index, Positive Symptom Total, and Positive Symptom Distress Index*). Each item is rated on a 5-point Likert scale, ranging from 0 (not at all) to 4 (extremely). Raw scores are converted into T-scores and compared to normative values being classified as above/below clinical range. The SCL-90 is normed on both clinical and nonclinical

populations and is a reliable and valid measure of psychological problems and symptoms. The Italian translation and adaptation of the SCL-90-R (Sarno et al., 2011) has been shown to have good internal consistency ($\alpha = 0.68\text{--}0.97$) in adolescents and adults.

For the purposes of the present study, we considered only the GSI as a measure of overall parental psychopathological distress.

Maternal cognitive functioning

Cognitive functioning was investigated at admission through the Esame Neuropsicologico Breve-2 (ENB-2; Mondini et al., 2011), a comprehensive neuropsychological battery standardized for the Italian population. The battery includes 16 subtests: digit span, immediate and delayed recall prose memory, interference memory at 10 and 30 seconds, trail making test part A and B, token test, word phonemic fluency, abstract reasoning, cognitive estimation, overlapping figures, spontaneous drawing, copy drawing, clock drawing, and ideomotor praxis test. These subtests allow to assess cognitive domains of attention, memory, comprehension, executive functioning, perception, and praxis abilities. The scoring system yields a score for each subtest and to a total score (the Global Cognitive Index - GCI), ranging from 0 to 100. The scores can be classified as below average, borderline, and above average, according to established norms. The battery has reported good psychometric characteristics, revealing good differential validity in discriminating normative and clinical groups and sufficient test-retest reliability (range from 0.57 to 0.97) (Mondini et al., 2003, 2011). Moreover, the battery has already been successfully applied to adults with SUD (Parolin et al., 2016; Porreca et al., 2018). For the purposes of the present study we considered only the GCI that summarizes the individual's cognitive functioning.

Plan of analysis

First, we present demographic characteristics of the sample and descriptive analysis of the variables of the study. Then we performed a series of confirmative analyses of EAS scales in order to test the

suggested one factor solution in each observation time and extract the factorial scores. Subsequently, we implemented a model comparison approach to determine the best predictive mixed linear models of the EAS scores across time. The models to be selected were a model with only the linear effect of time as predictor and then step by step we added the quadratic effect of time, the main effects of the global cognitive functioning score, psychopathological symptoms as well as the interaction between these focal predictor and the effects of time. The choice of the best model was based on a procedure of model selection depending on AIC scores as well as AIC weights (Wagenmakers & Farrell, 2004). All the analyses were performed with R (R Development Core Team, 2021).

Results

In Table 2 we present the descriptive analyses of the variables of the study.

Table 2. Descriptive analysis of the variables of the study

	M	SD	Median	min	max
Cognitive functioning	80.71	7.83	82.00	50.00	94.00
Psychopathological symptoms	0.92	0.58	0.73	0.06	2.43
Sensitivity	3.88	0.76	4.00	2.00	6.00
Structuring	4.09	0.74	4.00	2.00	6.00
Nonintrusiveness	4.30	1.19	4.00	1.50	7.00
Nonhostility	5.10	0.99	5.00	2.00	7.00
Ch. Responsiveness	3.77	0.83	3.50	2.00	6.00
Ch. Involvement	3.72	0.92	3.50	1.50	6.00

Note. Data are given as n (%), mean (standard deviation)

A confirmatory factor analysis on the EAS scores at t1 was performed in order to test the one factor factorial structure hypothesized. Results yielded a satisfactory solution ($X^2(5) = 9.12$, $p = 0.1$, $CFI = 0.98$, $TLI = 0.94$, $RMSEA = 0.12 [0 - 0.24]$) and therefore the factor scores were extracted and the same procedure was repeated for each time point of observations. Characteristics of the procedure are presented in the supplemental materials. In order to determine the best model able to explain the variability of the EAS factor scores, we provide AIC and AIC weights for each hypothesized model in Table, 3.

Table 3. Models selection

Model	Model Description	df	AIC	AICweight	BIC
0	Time	6	539.12	0.0001	561.87
1	Time + Executive Functioning	7	530.54	0.0048	556.81
2	Time + GSI	7	535.45	0.0004	561.98
3	Time + Executive Functioning + GSI	8	528.56	0.0128	558.58
4	Time + Time ²	10	539.30	0.0001	577.20
5	Time + Time ² + Executive Functioning	11	528.54	0.0129	569.82
6	Time + Time ² + GSI	11	535.90	0.0003	577.59
7	Time + Time ² + Executive Functioning + GSI	12	527.89	0.0179	572.92
8	Time + Executive Functioning Time*GSI	8	534.03	0.0008	564.05
9	Time + GSI + Time*GSI	8	541.78	0.0000	572.10
10	Time + Executive Functioning + GSI + Time*Executive Functioning + Time*GSI	10	537.26	0.0002	574.79
11	Time + Time ² + Executive Functioning + Time* Executive Functioning + Time ² *Executive Functioning	13	524.47	0.0991	573.25
12	Time + Time ² + GSI + Time* GSI + Time ² *GSI	13	534.63	0.0006	583.89
13	Time + Time ² + Executive Functioning + GSI + Time* Executive Functioning + Time ² *Executive Functioning + Time* GSI + Time ² *GSI	16	520.17	0.8500	580.21

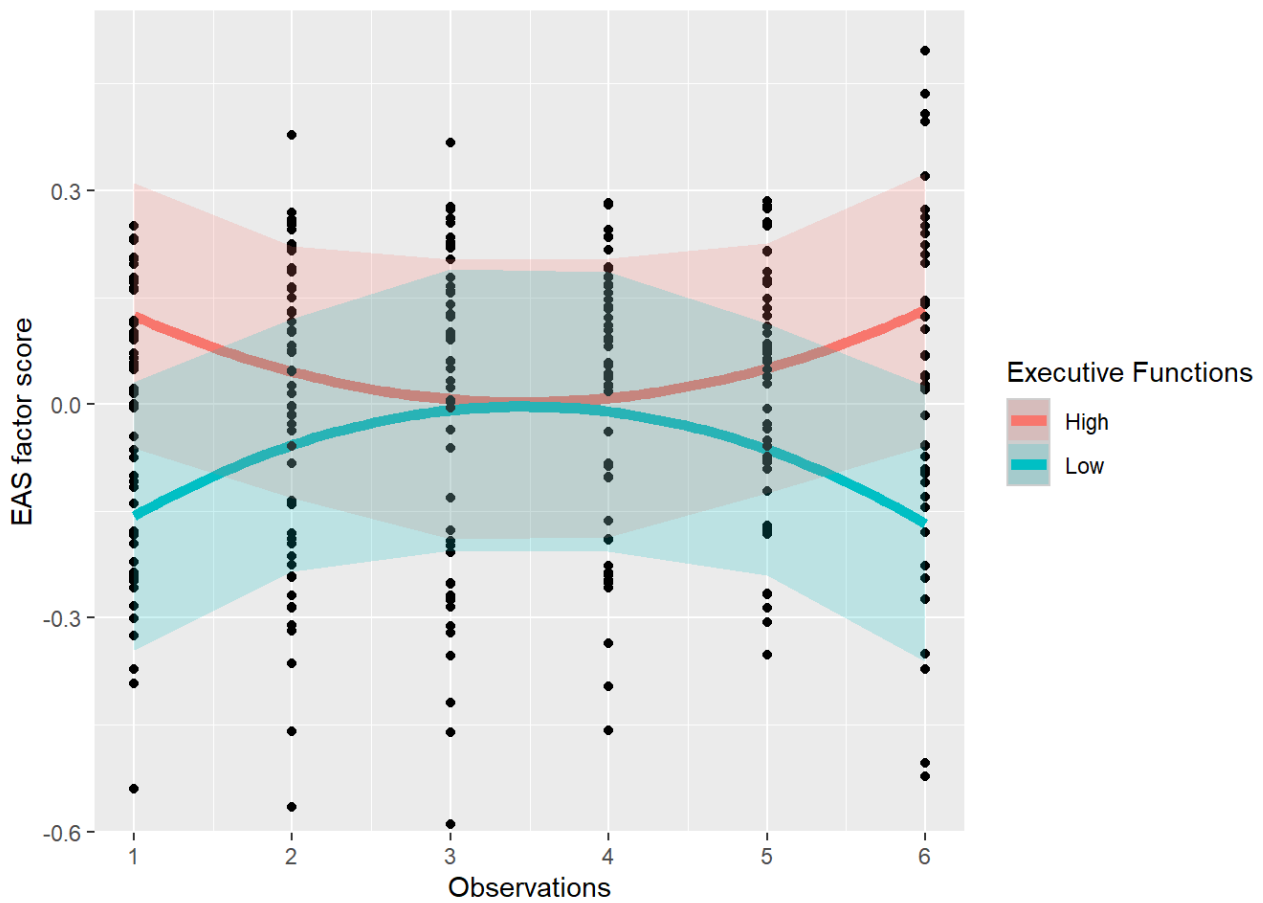
The best model resulted to be the last one, including both cognitive functioning and symptomatology scores, as well as the interactions between these scores and the quadratic and linear effects of time. The parameters of the selected model are presented in Table 4, showing a significant negative main effect of maternal self reported symptomatology and the significant interactions between both the linear and quadratic effects of time and the cognitive functioning scores. Notably, no interaction between time and symptomatology reached the statistical significant threshold. In order to explore the interpretation of the moderating role of cognitive functioning on the quadratic effect of time, a simple slope analysis was implemented. Results show that for low levels of cognitive functioning (i.e., 1 SD below the mean), the quadratic effect of time was significant and negative ($b = -0.95$, $SE = 0.47$, $t = -2.02$, $p = .04$), while for high levels of cognitive functioning the quadratic effect of time was significant and positive ($b = 1.09$, $SE = 0.46$, $t = 2.37$, $p = .02$). The graphic representation of the quadratic effects for high and low levels of executive functioning is presented in Figure 1.

Table 4. Parameters of the selected model*.

	b	95% CI	<i>p</i>
Intercept	-0.01	-0.13 – 0.11	0.837
Time	-0.02	-0.92 – 0.88	0.970
Time ²	-0.10	-1.01 – 0.80	0.821
Executive Functioning	0.07	-0.06 – 0.19	0.289
GSI	-0.18	-0.31 – -0.06	0.005
Time*Executive Functioning	1.67	0.76 – 2.57	<0.001
Time ² *Executive Functioning	1.02	0.12 – 1.93	0.027
Time*Executive Functioning	0.72	-0.22 – 1.66	0.134
Time ² *GSI	0.65	-0.29 – 1.59	0.177
Random Effects			
σ^2	0.20		
τ_{00} ID	0.18		
τ_{11} ID.time_quad	0.16		
ρ_{01} ID	-1.00		
ICC	0.47		
N ID	57		
Observations	315		
Marginal R ² / Conditional R ²	0.122 / 0.538		

*EA composite represents the outcome variable

Figure 1. Simple slope analysis of the moderating effect of the Executive Functioning on the association between time and EAS global score.



Discussion

The objective of the present study was to investigate the role of psychopathological distress and of executive functioning on quality of parent-child relationship during a residential treatment program for mothers with SUD. Previous literature highlighted that the co-occurring presence of psychopathological symptoms with the condition of substance misuse (Dixon et al., 2018; Salloum & Brown, 2017; Swendsen, 2000; Yilmaz & Dilbaz, 2016), represents an additional risk factor for caregiving practices in this clinical population (De Palo et al., 2014; Hans, 1999; Porreca et al., 2018; Zuckerman & Brown, 1993). In the condition of SUD, infant stimuli become less salient for parents due to the fact that the reward system is coopted by drugs, which become progressively more strongly

associated with the relief of stress and negative emotions, making other social stimuli less rewarding (Kim et al., 2017; Lowell et al., 2020). Altered neural responses to infant stimuli have been observed also in the presence of non-substance induced psychopathology (Laurent & Ablow, 2012; Malak et al., 2015), suggesting that, in mothers with SUD and co-occurring disorders the possibility to be sensitively responsive to child communications is exposed to a doubled risk. Specifically, the possibility to attune to child signals is reduced both by the efforts carried out to meet intensified needs subsequent to psychopathology (Berg-Nielsen et al., 2000; Zahn-Waxler et al., 2002) and psychophysical needs related to substance dependence, consumption, and abstinence (Rutherford & Mayes, 2017). Notably, the co-occurrence of substance misuse and severe psychological distress represents a negative prognostic factor for treatment response, with a higher risk of poor outcomes and treatment dropout (Haller et al., 2002; Herbeck et al., 2005; Howell et al., 1999). In line with our expectations, we found a negative main effect of maternal self-reported symptomatology on quality of parenting behaviors, suggesting that the perception of higher mental distress was associated to the experience of poorer caregiving practices and relational quality in offspring. Notably, the intensity of psychopathological symptoms perceived at admission to the facility did not allow us to distinguish among different trajectories within our group of participants, suggesting the need to further investigate the impact of psychopathology on change processes and treatment outcome. It might be that the severity of symptoms changed during the 15 months of observation and that this variability prevented the identification of more definite pathways. This hypothesis is in line with studies indicating that integrated treatment programs that provide support to parental role can decrease distress and psychopathological symptoms in the mothers (Huebner, 2002; Smith et al., 2010; Suchman, DeCoste, Castiglioni, et al., 2010).

On the other hand, a growing body of literature has identified cognitive functioning as an important prognostic factor for the treatment of addictions, with individuals with lower performances in executive functioning being at higher risk to relapse or to abandon treatment (Aharonovich et al., 2006; Brorson et al., 2013; Teichner et al., 2002). Interestingly, these same mechanisms have been

found important indexes of appropriate parenting (Deater-Deckard et al., 2012), allowing caregivers to organize emotions, thoughts, and attitudes into integrated plans of action (Dix, 2000; Shaffer & Obradović, 2017). Recently, these cognitive mechanisms have been found at higher risk of impairment in mothers with SUD (Porreca et al., 2018), with mothers with more severe cognitive difficulties exhibiting less sensitive and more intrusive behaviors toward their children. The results of the present study highlight that cognitive functioning is able to differentiate not only quality of parenting behaviors but also treatment outcomes in mothers with SUD. More specifically, in line with our hypothesis, mothers with higher cognitive functioning globally presented a better treatment ongoing, with a significant increase in quality of mother-child relationship. On the other hand, mothers with lower cognitive resources presented a poorer treatment course. Notably, for both groups we found a quadratic effect of our independent variables, suggesting that change might be nonlinear and discontinuous within this complex clinical population (Hayes et al., 2007). Different authors suggested that the process of change in psychotherapy is characterized by destabilization before change (Hager, 1992; Hayes et al., 2007; Hayes & Strauss, 1998). Thus, before providing a stable environment and increases patients' readiness and resources for change, therapy introduces a variety of interventions that interrupt, challenge, and destabilize old patterns (Hayes et al., 2007). From this perspective, treatment course could be characterized by discontinuous transitions, where significant changes are preceded by critical fluctuations and instabilities (Schiepek et al., 2003). Specifically, in our group, mothers with higher cognitive functioning presented a first decrease in quality of parent-child interactions, followed by a subsequent gradual improvement, whereas mothers with low cognitive resources exhibited the opposite pattern, characterized by a decrease in relationship quality after an initial improvement. We hypothesize that executive functioning in mothers with SUD might intervene as predisposing mechanism for better or poorer treatment outcomes. Of course, this mechanism interact with the specific treatment offer that in our case was characterized by a psychodynamic-oriented comprehensive approach mostly focused on adults, and to a lesser extent on quality of parenting. We speculate that, thanks to individual and group dynamic psychotherapy,

mothers with higher cognitive resources could gain access to a more complex comprehension of their psychic life, transferring insights on their inner relational mechanisms to the relationship with their children (Belt et al., 2012). This process, which requires higher cognitive resources, is anyway slow and results require longer time in order to be evident (Greenson, 2018; Knekt et al., 2011). On the other hand, mothers with lower cognitive functioning seemed to receive less help from this type of treatment. This results is in line with studies indicating that individuals with SUD exhibiting low executive functioning are less suitable from complex treatments, due to difficulties in learning and retention of new material (Aharonovich et al., 2006; Alterman et al., 1986), and in the acquisition of different coping behaviors (McCrary & Smith, 1986). Notably, this second group of participants presented an initial increase in quality of parent-child relationships, suggesting that, for this class of mothers, shorter interventions repeated in time could be more effective in targeting quality of parenting. This hypothesis seems in line with meta-analytic work providing evidence that families with multiple problems benefit more from interventions structured in a moderate number of sessions and with easily accessible themes (Bakermans-Kranenburg et al., 2003; Juffer et al., 2017). We speculate that, during the course of treatment, this second category derived much profit from educational interventions, which provided mothers with practical strategies on how to organize their children's care. Notably, educational interventions were strictly focused on practical skills and on the provision of basic care, lacking an emotional component that with this clinical population would have been more effective in enhancing relationship quality (Suchman et al., 2004, 2006).

Finally, as far as it concerns our third hypothesis, we did not find a significant interaction between adult psychopathology and cognitive functioning in shaping the longitudinal ongoing of quality of parent-child relationship. It might be that, although they have presented associations when considered as different domains of individual functioning (Barch et al., 2005; Taylor-Tavares et al., 2007), they may act through diver channels when affecting intervention outcomes.

Taken together, the data of the present study indicate that the both parental psychopathology and cognitive functioning affect the treatment of parent-child relationships in the context of maternal SUD, although with different effects. While psychopathological symptoms exert an overall and continuous effect during treatment, the quality of cognitive functioning is able to discriminate between different trends of change.

The current study presents a series of limitations. The first limitation concerns the small sample. The adoption of a larger group in the future could provide more information on the effect that psychopathology and cognitive functioning exerts in the context of parental SUD. A second limitation of the study is linked to the absence of a comparison intervention, the adoption of which in the future could help to understand how different treatments might intervene in this clinical population. It might be that shorter interventions, characterized by a more specific focus on parenting and on relationship quality might be more effective in enhancing quality of parent-child interactions (Bakermans-Kranenburg et al., 2003; Suchman et al., 2004). Moreover, it might be that an intervention characterized by more easily accessible contents which requires less cognitive efforts might be more profitable also for parents with low executive functions (Aharonovich et al., 2006; Bakermans-Kranenburg et al., 2003). A third limitation concerns the lack of repeated measurements of the independent variable in time. It might be that psychopathology and executive functioning are modified by treatment administration and these changes could be helpful to better understand the effects of treatment on parenting quality. Finally, a limitation is represented by the lack of measures specifically aimed at investigating maternal reflective functioning, which could be particularly important in determining parenting quality the context of SUD (Pajulo et al., 2012; Suchman et al., 2011). In our study this aspect was captured only to some extent through the observational coding system adopted and, thus, should be further investigated in future research, also in the light of the studies identifying possible associations between parental executive functioning and reflective abilities (Håkansson et al., 2018).

To be sensitive to a child's cues, mothers are required to be mentally flexible and to continuously maintain, switch, and update attention on different sources of information. Moreover, mothers are required to mentally represent their child's signals and needs; to disambiguate when needs are not clear; and to plan, organize, and coordinate their responses to the child's cues and behaviors. A deficit in one or more of these abilities could compromise the parent's capacity to be adequately sensitive and responsive to the child's signals. At the same time, similar impairments in these same areas, such as the lack of mental flexibility and difficulties in planning, organizing, and coordinating behavioral responses, as well as the impossibility to update these responses on the basis of the child's feedback (e.g., a child's protest for being interrupted during the ongoing of an activity might lead to parental intrusiveness).

Chapter 5

Planning parenting interventions in the context of SUD: Proposal for a randomized wait-list controlled trial to investigate the role of cognitive mechanisms in parenting interventions on mothers with Substance Use Disorder

Chapter 5: A. Porreca, A. Simonelli, P. De Carli, L. Barone, B. Filippi, P. Rigo, van IJzendoorn, M.H. and Bakermans-Kranenburg, M.J. (submitted). A randomized wait-list controlled trial to investigate the role of cognitive mechanisms in parenting interventions on mothers with Substance Use Disorder.

Abstract

In this chapter we present a study protocol describing a randomized wait-list controlled trial that aims to examine: 1) the efficacy of the Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline (VIPP-SD ; Juffer et al., 2008), an evidence-based parenting intervention, in improving quality of parenting in mothers with SUD, 2) whether the intervention affects parental cognitive mechanisms (i.e. attentional disengagement to infant negative emotions, inhibitory control confronted with children's affective expression, and parental reflective functioning), and 3) whether changes in these processes act as mechanisms of change, mediating the effect of the VIPP-SD program on quality of parenting. Moreover, the study aims 4) to explore whether the VIPP-SD has an effect on parenting stress and 5) to compare mothers with SUD to low-risk mothers on the outcome measures.

The study aims to involve 40 mothers with SUD and 20 low-risk mothers of children aged between 14 months and 6 years old. Mothers in the SUD group will be randomly divided in two groups, one receiving the intervention (SUD experimental group) and one undergoing treatment as usual (SUD control group). All the mothers will be assessed pre-test and post-test. Quality of parenting will be assessed through observed parenting behaviors, whereas parental cognitive mechanisms will be assessed through neuropsychological tasks and self-report measures.

The results of the study will reveal whether an intervention that has been proven effective in other at-risk samples (Juffer et al., 2017) is also effective in improving parenting behaviors in the context of SUD. The results will also provide insight into potential cognitive mechanisms involved in the process of change.

Introduction

Quality of parenting plays a fundamental role in infant development (Van Der Voort et al., 2014a) and is severely compromised in the context of maternal Substance Use Disorder (SUD; APA, 2013), a clinical condition highly associated with dysfunctional parenting practices that in their most severe forms could lead to child maltreatment (Walsh et al., 2003). Several authors point to the importance of implementing interventions that besides focusing on the condition of drug abuse or dependence per se also target parental functioning, given that recovery from the first is not necessarily associated to improvements in the latter (Bosk et al., 2019; Catalano et al., 1999; Espinet et al., 2016; Suchman et al., 2012). Moreover, a wide array of studies show the relevance of SUD-related cognitive impairments to better understand which mechanisms could mediate the effect of intervention (Aharonovich et al., 2006; Bates et al., 2002).

The present study protocol describes a randomized wait-list controlled trial in which we aim to examine the efficacy of the Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline (VIPP-SD ; Juffer et al., 2008) in improving quality of parenting in mothers with SUD. Secondly, the study aims to investigate whether the intervention affects parental cognitive mechanisms, improving attentional disengagement to infant negative emotions, inhibitory control in front of children's affective expression, and parental reflective functioning. Finally, the study aims to detect whether changes in parental cognitive mechanisms play a role in mediating the effect of the VIPP-SD program on quality of parenting measured through observed parenting behaviors. To accomplish this, we will compare mothers with SUD receiving the intervention (SUD experimental group), to mothers with SUD undergoing treatment as usual (SUD control group). In a second round of analyses, we will compare the intervention and control groups to a non-randomized comparison group of mothers recruited from the general population, to see whether the intervention reduces expected differences between mothers with SUD and low-risk mothers.

Quality of parenting in mothers with SUD

Observed parenting behaviors

Observed parenting behaviors constitute a key access to quality of parenting in infancy and childhood, providing a measure of the parent's ability to take care of the child and of the child's actual experience of care (Ainsworth et al., 1978; Beebe & Lachmann, 1998; Bowlby, 1969; De Wolff & van IJzendoorn, 1997; Tronick, 1989). Maternal SUD jeopardize quality of parenting behaviors, affecting in multiple ways sensitive parenting (Ainsworth, 1969; Ainsworth et al., 1978; Bowlby, 1969) and parental sensitive discipline (Juffer et al., 2017; van Zeijl et al., 2006a), two facets of positive parenting associated to favorable developmental outcomes in children (Groh et al., 2014; Weinfield et al., 2008). Compared to low-risk populations, mothers with SUD show less optimal sensitivity and responsiveness to children's emotional signals (Das Eiden, 2001; Flykt et al., 2012; Frigerio et al., 2019; Porreca et al., 2016; Salo et al., 2010), and are more inclined to be hostile, directive, and interfering with their activities (Bauman & Levine, 1986; Fitzgerald et al., 1990; Johnson et al., 2002; Pajulo et al., 2001; Rodning et al., 1991). These negative parenting behaviors have been linked to unfavorable outcomes in offspring, as insecure and disorganized attachments (Swanson et al., 2000), and a higher risk to be involved with child protective services (Matos et al., 2014). Moreover, mothers with SUD are more inclined to adopt negative disciplinary strategies (Blackwell et al., 1999), ranging from the use of harsh discipline (Bauman & Dougherty, 1983; Pears et al., 2007; Tarter et al., 1993), to the adoption of laissez-faire, characterized by withdrawal and lack of limit-setting, and role reversal (Baker & Carson, 1999; Strathearn & Mayes, 2010). These practices tend to be ineffective and are related to several undesired developmental outcomes in children, including internalizing and externalizing problems (D'Onofrio et al., 2007; Misri et al., 2006). Therefore, parenting behaviors constitute one of the main targets of parenting interventions in the condition of SUD (Suchman et al., 2004, 2006). In the present study, we aim to test the efficacy of the VIPP-SD, a short-term evidence-based parenting intervention based on attachment theory (Bowlby, 1969, 1982) and social learning theory (Patterson, 1982; Smith et al., 2014), in improving positive parenting strategies in a clinical

population of SUD mothers with young children. We will measure sensitive parenting and sensitive discipline using observational scales under various structured conditions, comparing mothers with SUD receiving the intervention, to mothers with SUD undergoing Treatment As Usual (TAU) and to low-risk mothers. According to previous studies, we expect that: 1) the quality of observed parenting behaviors in SUD mothers is higher after the intervention compared to the randomized control group; 2) mothers with SUD will, at pretest, show poorer parenting behaviors compared to the low-risk group.

Cognitive mechanisms involved in parenting

Attentional mechanisms: attentional bias to child negative emotions

Attentional processing of child stimuli provides one of the basic cognitive mechanisms for sensitive parenting. Human adults present a selective bias in the processing of infant faces, which is of potential evolutionary value (Lorenz, 1943b; Thompson-Booth et al., 2014) since it facilitates a detailed screening of facial mimicry and increases the likelihood of appropriate responses (Pearson & Lightman, 2013). It has been shown that parents present a preferential attentional bias for child negative emotions, finding it more difficult to disengage their attention from visual stimuli displaying sadness or distress (Pearson et al., 2011; Webb & Ayers, 2015). This process is attenuated in the presence of psychopathology and high parenting stress (Pearson et al., 2010; Thompson-Booth et al., 2014), and has proved to be sensitive to treatment (Pearson & Lightman, 2013). We hypothesize this same attentional mechanism to be disrupted in mothers with SUD, given the high incidence of parenting stress (Suchman & Luthar, 2001), psychopathology (De Palo et al., 2014; Hans, 1999), and the overlap between brain reward regions associated to substances and to infant-related stimuli (Kim et al., 2017; Landi et al., 2011). This hypothesis is further supported by studies that provide evidence for disruptions in normative attentional processes in the context of substance dependence (Field & Cox, 2008; Townshend & Duka, 2001).

In the current study, we aim to test whether attentional bias to child face in mothers with SUD, measured with a computerized neuropsychological task, is enhanced through the application of the VIPP-SD. According to previous studies, we expect that: 1) attentional bias to child negative emotions in mothers with SUD increases after the intervention; 2) at pre-test, mothers with SUD will show lower attentional bias to child negative emotions compared to the low-risk group.

Inhibitory mechanisms: inhibitory control when exposed to child emotions

Inhibition of parenting negative strategies represents another basic cognitive mechanism of sensitive parenting (Bridgett et al., 2017). At the cognitive level, the inhibition of non-optimal responses rely on inhibitory control, a “lower order” component of executive functions responsible for the regulation of attention, thoughts or behaviors, according to internal and external stimuli (Barrett & Fleming, 2011; Deater-Deckard, Wang, et al., 2012; Diamond, 2013; Fay-Stammbach et al., 2014). Chronic drug use is associated with severe frontal and prefrontal cognitive dysfunctions which result in the inability to inhibit dominant behavioral responses activated by craving, which lead to the search and assumption of drugs (Feil et al., 2010; Goldstein & Volkow, 2002; Lubman et al., 2004). Impairments in prefrontal activity are responsible for the onset and maintenance of substance dependence (Feil et al., 2010; Goldstein & Volkow, 2002; Jentsch & Taylor, 1999; Lubman et al., 2004; Schmidt et al., 2017; Verdejo-García & Pérez-García, 2007) and have been found in parents with SUD also when observing infants displaying different emotional expressions (Kim et al., 2017; Lowell et al., 2020).

Traditionally, inhibitory control has been investigated through go/no-go paradigms, which involve the presentation of stimuli, alternating go-conditions, where the individual has to respond to the displayed cue, and no-go conditions, where the individual has to inhibit their response (Diamond, 2013; Falkenstein et al., 1999). In the current study, we aim to test whether inhibitory control when exposed to child emotions in mothers with SUD, measured through a computerized emotional go/no-go task, improves after the administration of the VIPP-SD. We expect that: 1) inhibitory control when exposed to child emotions in mothers with SUD will increase after the administration of the

intervention; 2) compared to the low-risk group, mothers with SUD at pre-test will show lower inhibitory control when exposed to child emotions.

Parental reflective functioning

Reflective functioning describes the parents' ability to reflect upon their own and their children's experience and behaviors in terms of mental states (Fonagy et al., 1991; Fonagy & Target, 1997; Slade, 2005). This mechanism is associated with positive and negative parenting strategies (Barone & Carone, 2020; Fonagy et al., 2018; Fonagy & Target, 1997) and with children's use of their mothers as secure base (Grienenberger et al., 2005). Parents with SUD present difficulties in emotion regulation (Porreca et al., 2020) as well as poor reflective functioning abilities, with the risk to develop negative, idealized, or fragile representations of their children and their parental role (Suchman et al., 2008; Suchman, Pajulo, DeCoste, et al., 2006; Suchman, DeCoste, Castiglioni, et al., 2010). Postnatal levels of mentalizing abilities have been identified as predictors of clinical prognosis in the context of substance abuse (Pajulo et al., 2012), and reflective functioning represents an important target of parenting interventions within this clinical population (Pajulo et al., 2012; N. Suchman, Pajulo, DeCoste, et al., 2006). Improvements in reflective functioning in response to parenting interventions have been associated with increases in quality of observed parenting behaviors and with improvements in children's regulation (Suchman et al., 2008, 2012). For the purposes of the present study, we will examine self-reported parental reflective functioning pre- and post- intervention. We expect that: 1) reflective functioning in mothers with SUD improves after the intervention; 2) mothers with SUD at pre-test present lower reflective functioning abilities with respect to the low-risk group.

Other variables relevant in the context of maternal SUD

Given the complexity of the SUD condition, especially in parents, various domains of adult functioning will be included as control variables in the present study. A brief description and rationale for each one is reported below.

Parenting stress

Parents with SUD are more likely to experience high levels of stress in their caregiving role, much of which is dependent on the condition of substance addiction and related risk factors, such as health conditions and psychosocial difficulties (Håkansson et al., 2018b; Kim et al., 2017; Nair et al., 2003; Suchman & Luthar, 2001). The reiteration of substance use in time decreases the salience of infant-related stimuli, that become less rewarding for parents and risk to be perceived as a source of additional stress rather than part of a mutually fulfilling system (De Carli et al., 2019; Kim et al., 2017). High levels of parental stress have been often linked with difficulties in providing high-quality parenting, and are associated with hurdles in parent-child interactions, lack of parental warmth and increases in harsh parenting (Pinderhughes et al., 2000). For the purpose of this study, we will measure parental stress before and after intervention, expecting a decrease in levels of stress after treatment.

Parental psychopathology

Individuals with SUD present an increased risk for psychopathology and psychological maladjustment (Couwenbergh et al., 2006; Kessler, 2004), which has been linked to poor executive functioning (Nigg et al., 2017) and to several adverse treatment outcomes, such as increased severity in individual maladjustment and early relapse to substance use (Andersson et al., 2019). The presence of psychopathological symptoms in parents with SUD represents an additional risk factor for caregiving practices, exacerbating difficulties experienced during parent-child interactions and increasing the risk to adopt negative parenting strategies (Bays, 1990; Brooks et al., 1994; Porreca et al., 2018). In the present study, we will control for the potential confounding role of parental

psychopathology when examining the efficacy of the VIPP-SD. Parental psychopathological symptoms and psychological distress will be measured pre- and post- treatment and considered as confounder.

General executive functioning

Inhibitory control represents a “lower order” component of executive functions, and together with working memory and cognitive flexibility (Diamond, 2013; Lehto et al., 2003; Miyake et al., 2000), allows for the activity of “higher order” executive functions, such as reasoning, problem solving, and planning (Collins & Koechlin, 2012; Diamond, 2013; Lunt et al., 2012). A wide array of research has highlighted that individuals with chronic and heavy substance abuse present with damages to executive functioning, which could act as predisposing, retention, and relapse factors for substance assumption (Aharonovich et al., 2003, 2006; Bates et al., 2002; Cummings, 1995; Ersche et al., 2012; Goldman & Goldman, 1988). Moreover, research on parenting found some associations between executive functions and parental practices (Barrett & Fleming, 2011; Deater-Deckard et al., 2012). In the present study, we will control for the potential confounding role of general executive functioning to investigate the specific impact of VIPP-SD on parental inhibitory control when exposed to child emotions and to ascertain its role as mechanism of change in parenting behaviours. Parents’ general executive functioning will be measured pre- and post- treatment and its residual score after taking into account its overlap with inhibitory control will be used as a potential confounder in statistical analyses.

Intervention

For the purpose of the current study, we selected as eligible treatment the VIPP-SD (Juffer et al., 2007, 2008), an evidence-based intervention aimed at enhancing parental sensitivity and sensitive discipline in parents of toddlers and preschool children. The protocol has proven to be effective in different randomized controlled trials in various populations (Barone et al., 2019; Euser et al., 2021;

O'Farrelly et al., 2021), with a recent meta-analytic study reporting a combined effect size of $d = 0.47$ (Juffer et al., 2017), and its characteristics appear particularly suitable for parents with SUD.

Specifically, the limited number of sessions, the focus on interactive behaviours, and the home-based nature of the protocol are likely to help maintain the mothers' engagement, limiting the risk of dropouts before the end of treatment (Bakermans-Kranenburg et al., 2003; Blow et al., 2017; Scherbaum & Specka, 2008). The ease of understanding of the contents support comprehension of the intervention themes, preventing dropout risks linked to deficits in attention and cognitive functioning (Aharonovich et al., 2003, 2006). The use of the video-feedback technique, the focus on child signals (Suchman et al., 2004), and the provision of information on child development could help parents to adapt their interaction to the child's age-appropriate level (Isosävi et al., 2016; Tedgård et al., 2019). These features support the feasibility of applying the intervention to this specific clinical population, offering the possibility to administer it both in the context of outpatient and inpatient conditions.

Aims and hypotheses

1) Our primary aim is to investigate intervention effects on the quality of parenting measured through observed parenting behaviors, in mothers with SUD. We will investigate whether the intervention affects sensitive parenting and gentle but consistent discipline. We expect that, from pre-test to post-test, quality of observed parenting in the SUD experimental group increases more or decreases less than in the SUD control group.

2) Our secondary aim is to investigate intervention effects on parents' cognitive mechanisms. We will investigate whether the intervention affects parents' performances on 2a) an attentional bias reaction time paradigm and on 2b) a go/no go task involving child faces displaying different emotions aimed at measuring attentional bias to negative emotions and inhibitory control in response to child emotions, respectively. Moreover, we will investigate whether the intervention affects 2c) self-perceived reflective functioning. We expect that the

intervention modifies parents' performances on the two tasks and self-reported reflective functioning in the SUD experimental group with respect to the SUD control group.

3) Our tertiary aim is to investigate whether changes in parental cognitive mechanisms affect intervention effect on parenting. Specifically, we will investigate whether changes in 3a) parents' attentional bias, 3b) inhibitory control, and 3c) reflective functioning account for changes observed in parenting. Specifically, we expect that improvements in parents' performances on the cognitive measures will be associated to improvements in quality of observed parenting in the SUD experimental group (Fig 1).

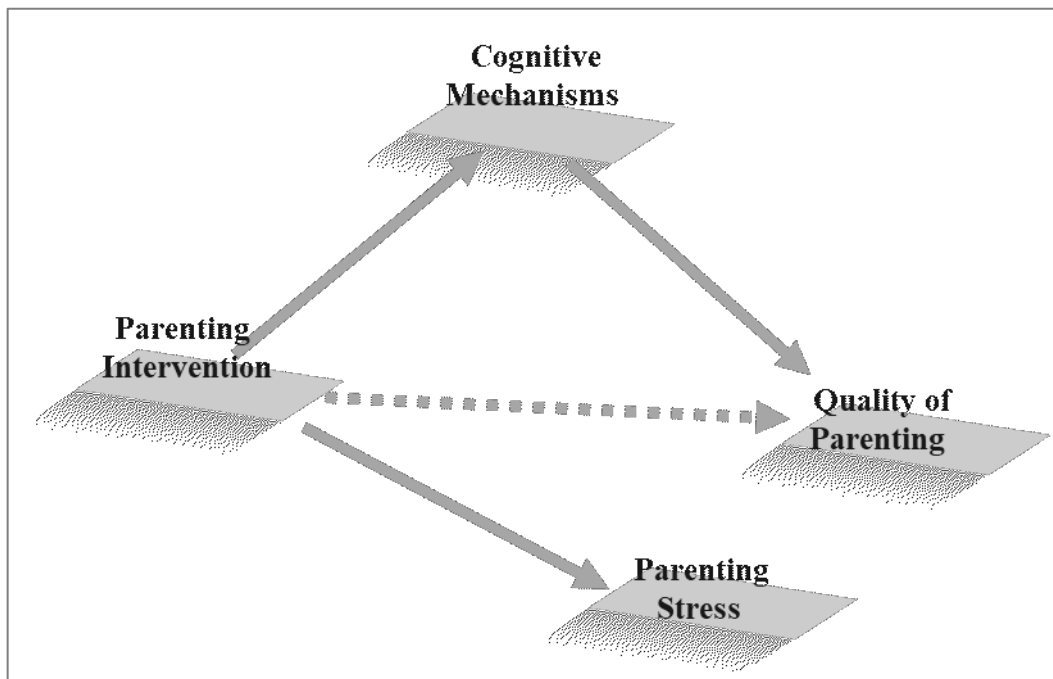


Figure 1 – Aims of the study and hypothesized mechanisms of change. Dotted lines represents direct effects. Solid lines represent indirect effects.

4) Our fourth objective is to explore whether the administration of the intervention has an effect on parenting stress. Specifically, we expect that, after the administration of the VIPP-SD, perceived parenting stress in the SUD experimental group decreases compared to the SUD control group.

5) Our fifth objective is to compare the SUD experimental group and the SUD control group to the low-risk group with respect to post-test measures.

Methods

Study design

The study is a randomized wait-list controlled trial aimed at investigating the role of parental inhibitory control, attentional disengagement, and reflective functioning in the efficacy of the VIPP-SD parenting intervention in mothers with SUD. The protocol was developed in line with the SPIRIT guidelines (See Additional file 1). The project will involve a group of mothers with SUD and a group of low-risk mothers. The intervention will be randomly delivered to half of the mothers in the SUD group, through a wait-list approach. Specifically, mothers from the SUD group will be randomly assigned to one of two conditions: 1) an experimental condition (SUD experimental group), treated with the VIPP-SD, and 2) a wait-list condition (SUD control group), with TAU. Participants in both groups will be assessed pre- and post-treatment/wait-list for primary and secondary outcome measures. Participants in the SUD experimental group will be reassessed at a 2-month follow-up, whereas at the end of the post-test phase participants in the SUD control group will be administered the intervention.

Mothers in the low-risk group will undergo two measurements (respectively assessment 1 and assessment 2) at a 3-month distance, that will serve as comparison for the pre-test and the post-test phase of the SUD experimental group. Figure 2 presents the diagram of participants' flow through the trial.

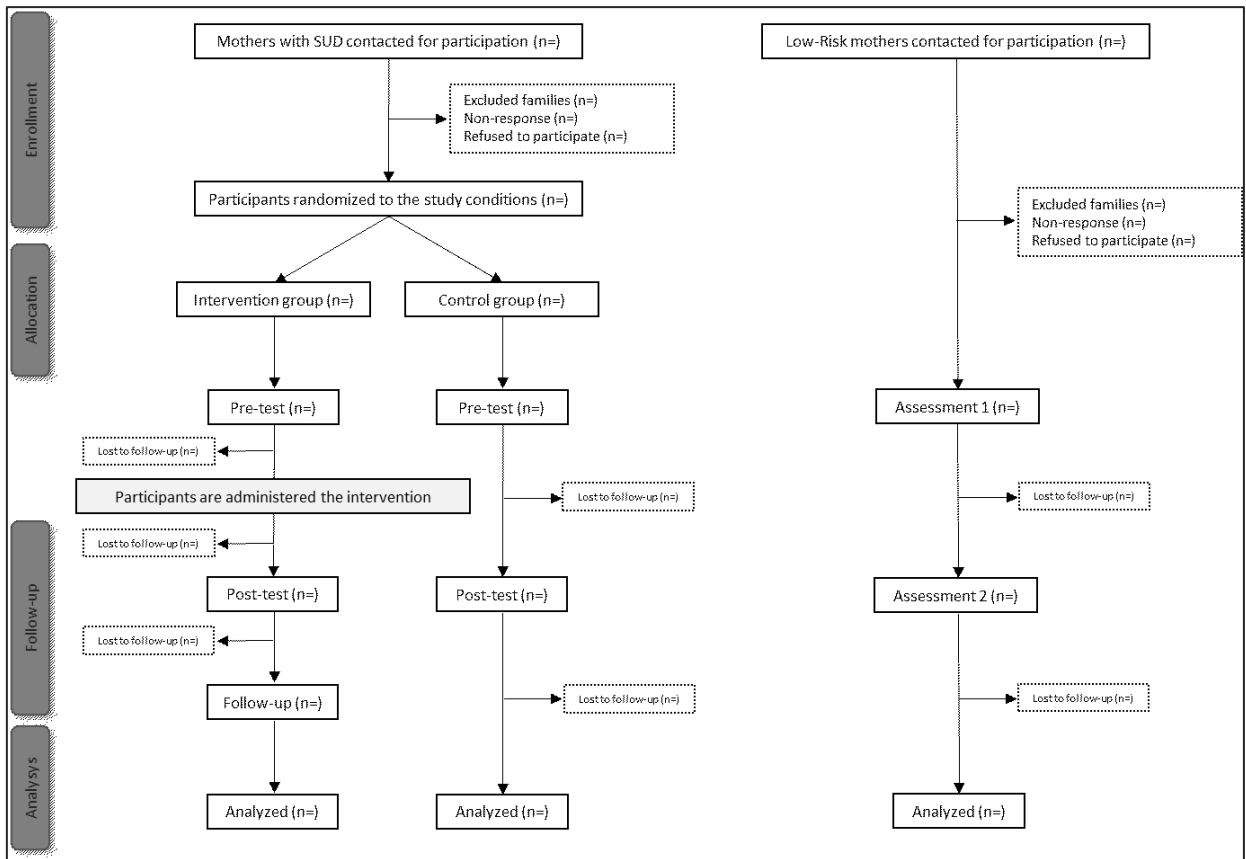


Figure 2 - Diagram of participants' flow through the trial

Participants

Recruitment

The project will involve 60 mothers with toddlers and preschool children. The SUD group (n=40) will be composed of women with history of SUD diagnosis, intended as severe substance abuse or dependence (see APA, 2013 for diagnostic details), recruited through residential and outpatient facilities that treat SUD and other psychiatric disturbances. The low-risk group (n=20) includes mothers recruited from the general population. Mothers in the SUD group will be contacted through the help of health care providers, whereas mothers in the low-risk group will be contacted through family centers, nursery schools and academic database sources. Potential candidates will be invited to take part in the study and will receive more information and asked informed consent when they agree to participate. Exclusion criteria will concern the presence of diagnosed psychotic disorders in an active phase, organic brain disorders that prevent the execution of the tasks, and child

developmental disorders. Moreover, exclusion criteria also concern the presence of an active condition of SUD in the low-risk group. Participation in the study is free.

Randomization

Randomization of the SUD group to the SUD experimental and SUD control group will be carried out a priori and each participant will be assigned to a predetermined condition once enrolled in the study. We will adopt a blocked randomization with randomly selected block sizes, stratified with respect to child's gender and age. Blocked randomization enhances the chance that treatment groups are equal in size and uniformly distributed according to key outcome-related characteristics (Efird, 2011). For the present study, randomization will be carried out through computer-generated random number lists. To avoid selection bias, an independent researcher, who is not involved in data collection or coding, will be charged to assignment of the participants to each condition.

Sample size and power

Recent meta-analytic work testing the effectiveness of VIPP-SD on sensitive parenting yielded a combined effect size of $d=0.47$, indicating that the intervention significantly increases sensitive caregiving (Juffer et al., 2017). For the purposes of the present study, a statistical power analysis was performed for sample size estimation (repeated measures ANOVA within-between interaction, G*Power 3.1.9.2). For our primary, secondary, and fourth aims, testing the effect of the intervention on parenting and on parental cognitive mechanisms through repeated measures analyses with $\alpha=.05$, a statistical power $(1-\beta)=0.80$, and a medium sized effect of $d=0.47$, a minimum sample size of $n=34$ is required. For our third and fifth aim, testing mediating mechanisms, the proposed sample size ensures a power $>80\%$ since the power to detect mediating effects is generally larger than it is for main effects (Kenny & Judd, 2014).

Intervention

Intervention group

Participants in the SUD experimental group will be administered the VIPP-SD, an evidence-based intervention that adopts the technique of video-feedback for enhancing 1) sensitive parenting and positive parent-child relationships, and 2) sensitive discipline, reducing children's emotional and behavioral problems (Juffer et al., 2017). The protocol is based on attachment theory (Bowlby, 1969, 1982) and on social learning theory (Patterson, 1982; Smith et al., 2014). The intervention is manualized and delivered in 6 sessions, each one affording themes relevant for sensitive parenting and sensitive discipline. The manual describes the structure, the themes, and the exercises suggested to parents during the different sessions (Juffer et al., 2017). Each home visiting begins with the videotaping of structured parent-child interactions, which are then reviewed together with the intervener during the following sessions. Between sessions, the intervener prepares comments for each video fragment to-be-seen according to the themes that in each meeting are salient for sensitive parenting and sensitive discipline (see table 1). Themes for sensitive parenting concern the difference between exploration versus attachment behavior, the technique of speaking for the child, the importance of sensitivity chains and of sharing emotions during parent-child interaction. Themes inherent sensitive discipline concern inductive discipline and distraction, positive reinforcement, sensitive time-outs, and empathy for the child (Juffer et al., 2008, 2017). The first four sessions introduce these relevant topics whereas the two last session serve as booster sessions to revise and integrate the themes previously afforded and to reinforce new acquisitions in the parent (Juffer et al., 2017). The VIPP-SD has been applied to different settings (Barone et al., 2018; Groeneveld et al., 2011; Werner et al., 2018), including residential facilities (Casonato et al., 2017), and has been successfully adopted with different clinical and at-risk groups (Kalinauskiene et al., 2009; Pereira et al., 2014; van Zeijl et al., 2006b). Previous meta-analytic work provided evidence for a substantial effect of VIPP-SD in positively enhancing positive parenting (Juffer et al., 2017). Treatment fidelity will be guaranteed through continuous supervisions of the interveners with the fourth author, official Italian trainer on the method.

Table 1 – Themes relevant for the VIPP-SD

Session	Sensitive parenting	Sensitive discipline
1.	Exploration vs. attachment behavior	Inductive discipline and distraction
2.	Speaking for the child	Positive reinforcement
3.	Sensitivity chain	Sensitive pause
4.	Sharing emotions	Empathy for the child
5.	Booster session	Booster session
6.	Booster session	Booster session

Retrieved from Juffer et al. (2017)

Wait-list group

The experimental SUD group will be administered the VIPP-SD immediately after the pre-test phase whereas, during this period, participants in the SUD control group will undergo TAU which involves individual and group psychotherapy, psychopharmacological treatment, and educational intervention. After the post-test phase, the intervention will be delivered also to the wait-list group.

Measures

Primary aim

Our primary aim is to investigate whether the intervention is effective in improving quality of parenting, measured through observed parenting behaviors operationalized as parental sensitivity and sensitive discipline. According to previous work (Joosen et al., 2012), parental sensitivity will be assessed during free play, whereas sensitive discipline will be assessed during two compliance task, a don't touch situation and a clean-up situation. Each procedure will be video-recorded and coded by raters blinded to the aims of the study and to the participants' condition. The observational procedures

will be assessed with the Emotional Availability Scales (Biringen, 2008), 6 scales that evaluate the parent's and the child's contribution to the interaction. Moreover, sensitive discipline will also be assessed through a scale aimed at assessing the presence of verbal or physical harsh discipline (Joosen et al., 2012). Trained raters, blinded to the study objectives and to the participants' condition, will code videotapes. Regular meetings with the developers of the coding systems will be scheduled, to guarantee reaching of sufficient inter-rater reliability and avoiding rater drift.

Secondary aim

Our secondary aim is to investigate intervention effects on parental attentional disengagement to infant negative emotions, on parents' inhibitory control in front of children's emotions, and on parental reflective functioning. A description of the measures adopted for each mechanism is provided in the following sections.

Measurement of attentional disengagement

Maternal disengagement to infant negative emotions will be measured through an attentional bias reaction time paradigm (Pearson et al., 2010). During this attentional task, subjects are required to focus on a central go/no-go signal on the computer screen (a green or a red cross). A horizontal and a vertical line are presented as peripheral stimuli at the two extremities of the screen. The red central cross represents no-go trials, where participants are required to press the space bar. The green cross indicates go trials, where the individual is required to localize the position of the horizontal bar and press the appropriate keyboard response (A=left, L=right). During the task, distressed or non-distressed infant faces will appear behind the cross, as background images, slowing down the disengagement of attention. Each trial will begin with a fixation cross at the center of the screen (750 ms), followed by the stimulus display (240 ms, including the go/no-go signal, the face stimuli and the two peripheral lines), and finally a blank screen until a response is registered. Participants are instructed to ignore pictures appearing in the task. An index of attentional bias towards distressed

infant faces will be calculated, computing the difference between mean reaction times (ms) on distressed and non-distressed infant trials for each individual (Pearson et al., 2010, 2011).

Measurement of inhibitory control

Parents' inhibitory control in front of children's emotions will be assessed on a computerized go/no-go task involving child faces displaying different emotions (positive vs negative). Visual stimuli are selected from the Child Affective Facial Expression set (LoBue & Thrasher, 2015), a validated set of 2- to 8-year-old children's faces. During the emotional go/no-go task the participants will be randomly presented with a child showing a positive or a negative emotion. Positive emotions represent go trials, where participants are required to press the space bar. Negative emotions indicate no-go trials, where individuals are required to inhibit their behavior, doing nothing. Each trial will begin with a fixation cross at the center of the screen (2000 ms), followed by the stimulus presentation (500 ms), and a blank screen with a fixation point (1500 ms) for response registration. Each of the 60 faces will be shown once, for a total of 60 trials. Reaction times and accuracy of the performance will be recorded and yield a measure of the parents' inhibitory control when exposed to children's affective expressions.

Given previous studies reporting correlations between selective attention and inhibition of action in normative (Friedman & Miyake, 2004) and addicted individuals (Field & Cox, 2008; Loeber et al., 2009) preliminary correlational analysis will be carried out on performance on the two cognitive tasks. When the two measures are correlated, a composite score will be calculated (Landis et al., 2000; Song et al., 2013). When not, performances at the two tasks will be considered as separate variables in statistical analyses.

Measurement of parental reflective functioning

Parental reflective functioning will be assessed using the Parental Reflective Functioning Questionnaire (Luyten et al., 2017), a 18-item self-report measure aimed at investigating perceived reflective functioning in parents, intended as curiosity about the child's mental states, effort/refusal to understand mental states and how they relate to behavior.

Tertiary aim

Our tertiary aim is to investigate whether changes in parents' emotional modulation of inhibitory control, attentional disengagement, and reflective functioning account for changes in quality of parenting. To do this we will examine whether changes in parents' performances on the attentional bias reaction time paradigm and on the go/no go task involving child faces displaying different emotions, as well as parental self-reported reflective functioning account for changes in observed parenting behaviors.

Fourth aim

Our fourth objective is to explore whether the administration of the intervention has an effect on parenting stress, which will be measured through the Parenting Stress Index – Short Form (Abidin, 1990), a 36-item self-report measure aimed at investigating the stress experienced by parents during parental practices.

Fifth aim

Our fifth objective is to compare the SUD experimental group and the SUD control group to the low-risk group. To do this we will compare the post-test measurements of the experimental and control SUD groups with the two assessments in the low-risk comparison group.

Control variables

When testing changes in parents' inhibitory control attentional disengagement, and reflective functioning, we will control for the potential confounding roles of general parental executive functions, and parental psychopathology. As far as it concerns general executive functions, we will measure inhibitory control, working memory, cognitive flexibility, and planning through standardized neuropsychological tasks involving neutral stimuli. Specifically, we will use a Go/no-

go task (Bezdjian et al., 2009), the Corsi Block-Tapping Task (Corsi, 1973; Kessels et al., 2000), a short-form of the Berg Card Sorting Test (Berg, 1948; Fox et al., 2013; Nelson, 1976; Piper et al., 2012), and the Tower of London Test (Fimbel et al., 2009; Phillips et al., 1999; Shallice, 1982). All the tasks are computerized and retrieved from the open source software system PEBL - Psychology Experiment Building Language (Mueller & Piper, 2014).

Concerning parental psychopathology, we will administer the Symptom Checklist-90 Revised (Derogatis, 1994), a 90-item self-report questionnaire designed to evaluate the presence of psychopathology along different symptom dimensions and global distress indexes.

Statistical analyses

Statistical analyses will be carried out according to Intention-to-treat principles (McCoy, 2017). Data distributions will be inspected to check for normality and data transformation will be applied when normality assumptions are violated (Draper & Cox, 1969). Missing data will be inspected to check whether they are missing completely at random, at random, or not at random, and multiple imputation procedures will be applied to manage them (Jeličić et al., 2009). For the primary, the secondary, and the fourth aim, we will first adopt linear mixed models for intent to treat analyses, and subsequently apply repeated measures models on complete cases. To estimate the intervention effect on parenting and on parental cognitive mechanisms, we will define experimental condition as between-subjects factor and time-point measurements as within-subjects factor. For our tertiary and fifth aims, we will use the Montoya & Hayes approach (Montoya & Hayes, 2017) in a repeated measures design to test whether changes in cognitive mechanisms mediate the intervention effects on parenting.

Data management and ethics

The study will be carried out in line with national and international standards of good clinical practice. All the participants will be asked written and verbal informed consent and during the entire unfolding of the project participants will be reminded that participation to the study is voluntary and that they

have the possibility to withdraw from the study at any time, without consequences. The research protocol received ethical approval by the Ethical Committee of the University of Padua (Protocol: 3475). All data will be managed confidentially and stored on secure drives of the University of Padua. Part of the data could be temporarily stored on drives of the Universities of Pavia, Erasmus University Rotterdam, Vrije Universiteit Amsterdam due to coding, supervision, and statistical analyses. The VIPP-SD has been previously used in a number of studies, including clinical populations, and did not present risks associated with the intervention. No criteria for interrupting the administration of the intervention have been highlighted, except that of the participants' choice. Authorships for journal articles will be defined according to APA or ICMJE guidelines.

Discussion

The present study protocol describes a randomized wait-list controlled trial in which we aim to test the effect of the VIPP-SD in improving quality of parenting and in changing parents' cognitive mechanisms in the context of parental SUD. Moreover, the current study aims to test whether changes in cognitive mechanisms account for changes in observed quality of parenting. Testing these hypotheses has a significant impact both from a clinical and an empirical point of view.

Clinically, testing an intervention which is brief, standardized, and effective in improving quality of parenting and of parent-child relationships could provide an important addition to programs that target parents with SUD. This intervention could be adopted in facilities and by healthcare providers parallel to interventions aimed at reducing substance abuse and parental psychopathology. Moreover, the adoption of such an intervention could sensitize healthcare providers and social workers to the importance of promoting sensitive parenting behavior, which is not only focused on instrumental care and satisfaction of basic needs, but also emotionally attuned to the child's communications.

From an empirical perspective, the present study could provide further knowledge of the mechanisms underlying observable parenting and important insights into the cognitive mechanisms that could mediate the behavioral effect of interventions.

Strengths of the study are represented by the adoption of a Randomized Controlled Trial design, the collection of behavioral measures (observed parenting behaviors and cognitive tasks), and the use of an evidence-based intervention that has proven effective in previous RCTs in various at-risk samples. Novelty of the study is also the focus on a specific clinical sample, for which the intervention has not been tested yet.

Limitations of the protocol are linked to the use of self-report measures for parenting stress, reflective functioning, and psychopathology, and to the heterogeneity of the sample (due to the condition of poli-abuse of substances).

Trial registration

The trial has been registered on ISRCTN registry (Trial ID: ISRCTN63070968) on 25/06/2021.

Chapter 6

General discussion

The focus of this dissertation was the investigation of quality of parenting in mothers with SUD, considering the role that cognitive mechanisms and psychopathology could have on quality of parenting behaviors. SUD is a growing epidemic throughout the world (Spehr et al., 2017), and the number of infants exposed to substance use in utero has dramatically increased during the last years (Forray, 2016; Patrick et al., 2012). This phenomenon could have potential lasting effects on child developmental trajectories (Behnke & Smith, 2013; Mansoor et al., 2012). Additionally, children of all ages are being affected by parental substance use in the home, after pregnancy, through an increased risk to experience poor quality parenting practices (Spehr et al., 2017). Children of parents who are abusing drugs are at an increased risk for abuse and neglect, and are more likely to witness domestic violence and to be involved with child protection services (Simmons et al., 2009; Smith et al., 2016). Short-term effects of parental use of illicit drugs, such as altered judgment and lethargic states, can result in lowered parental attention to child needs and communications, as well as in reduced sensitive responses to them (Spehr et al., 2017). Moreover, prolonged substance dependence is associated to difficulties in the inhibition of improper parental responses as well as hurdles in the regulation of negative emotions (Frigerio et al., 2019; Salo et al., 2010). During all stages of childhood, parental SUD is at higher risk to be associated with instability and lack of safety and structure in the home setting (Smith et al., 2016). Identifying and intervening on poor quality parenting strategies is of particular importance, given that they could further exacerbate the effects of prenatal exposure (Simmons et al., 2009).

Recent studies highlight that in the context of SUD, the different individual and environmental difficulties associated to the condition of substance misuse could exert an additional risk factor for parenting quality (Håkansson et al., 2018; Hans, 1999; Porreca et al., 2018; Suchman & Luthar, 2000). Anyway, still little is known about these topics, and much more research has to be done to properly understand these complex interactions.

In the present work, we specifically addressed to the effect that co-occurring psychopathological symptoms and deficits in cognitive functioning could have on quality of parenting

behaviors, which represents a direct measure of appropriateness of care and of the child's experience of nurturance. As we highlighted in the introduction section, the presence of psychopathological symptoms (Ramchandani & Stein, 2003; Stein et al., 2009; Stein & Harold, 2015) and of cognitive difficulties (Deater-Deckard & Sturge-Apple, 2017; Shaffer & Obradović, 2017) is often associated to diminished quality of parenting behaviors. Notably, these difficulties are intensified in the condition of substance misuse (Håkansson et al., 2018; Hans, 1999) , and thus require additional attention. Further disentangling the complex relationship between cognitive, psychopathological, and behavioral features in parents with SUD could have important implications in terms of both assessment and intervention. The main findings of the studies presented in this dissertation support the assumption that maternal SUD represents a significant risk factor for parenting and quality of parent-child relationships and needs to be addressed properly and timely. Anyway, these difficulties seem characterized by individual variability, which can be related to patterns of mother-infant interactions, as well to parental psychopathological and cognitive characteristics. In this last chapter we provide a concise summary of the main results of the studies presented (Chapters 2, 3, 4), discussing their implications with respect to clinical practice. Limitations and suggestions for future directions are also addressed.

Assessing parenting behaviors in the context of SUD

The aim of Chapter 2 was to investigate quality of parenting behaviors in mothers with SUD identifying patterns of Emotional Availability (EA) through clustering analysis. EA focuses on the dyadic and emotional quality of parenting behaviors and child interactive behaviors, considering the extent to which individual is open and responsive to the emotional signals and goals of the other (Biringen & Robinson, 1991; Sorce & Emde, 1981). Given its specific focus on the emotional features of parenting behaviors and the inclusion of both parent's and child's contribution this approach provided an important view on quality of caregiving and on global dyadic functioning (Biringen et

al., 1998). Despite the well-known transactional nature of caregiving practices and of parent-child interactions (Sameroff, 1975), the assessment of parenting behaviors has been often reduced to the measurement of single variables, running the risk to obscure variability in more complex interactive patterns within the dyad (Biringen et al., 2000; Bornstein et al., 2012; Mingo & Easterbrooks, 2015). In this, the adoption of the EA frame and cluster analysis was a useful methods for simultaneously acknowledging the contribution of each partner in shaping quality of parent-child relationship.

In our study, we found four distinct patterns of mother-child interactive functioning, each one with specific characteristics. These distinct behavioral configurations demonstrate that, in the context of parental SUD, a lot of variability between parenting behaviors and infant interactive competencies might be present, and should be addressed accordingly. Moreover, these data highlight that different patterns of parent-infant functioning are differently related to individual and socio-demographic or clinical characteristics, suggesting that the different risk factors implicated in the condition of SUD could be distinctly involved in specific caretaking strategies.

Considering psychopathology in the context of parental SUD

The aim of Chapter 3 was to further investigate the role of co-occurring psychopathological symptoms on quality of care in maternal SUD. Specifically, we examined the impact of maternal alexithymia on quality of parenting behaviors in mothers with SUD during residential treatment. Alexithymia is a disorder of affect regulation with a high frequency in the context of substance misuse and, given that caregiving practices in early childhood largely rely on emotional processes, it could severely impact on quality of parenting. The results our study highlight a significant impact of alexithymia on quality of parenting, even after controlling for other psychopathological symptoms. In particular, the strongest effect was found for maternal structuring, suggesting that difficulties in becoming aware of one's own feelings could impair the ability to scaffold interactions and set age-appropriate limits in an emotionally attuned way. Globally, the results of this study support the

assumption that the presence of psychopathology co-occurring with the condition of substance misuse represent an additional risk factor for quality of care. Moreover, these data support the need to consider different aspects of caregiving, given that diverse domains of parenting behaviors might represent coherent but distinctive constructs being relatively independent from one another.

Considering cognitive mechanisms in the context of parental SUD

The aim of Chapter 4 was to examine the role of psychopathological symptoms and of cognitive functioning on quality of parent-child relationship during a residential treatment program for mothers with SUD. Both psychopathology and cognitive functioning are important for adequate caregiving, and different studies highlighted that this mechanisms exert a significant effect in the treatment of individuals with substance misuse. To carry out the study, we adopted an observational longitudinal research design, where quality of parent-child relationships was observed every three months during the first 15 months of a psychodynamic-oriented residential treatment. The results of the study provided evidence that both parental psychopathology and cognitive functioning affected the treatment of parent-child relationships in the context of maternal SUD, although with different effects. While psychopathological symptoms played an overall effect on quality of mother-child relationship, the cognitive performances were able to differentiate between different pattern of change across the period considered. Globally, the data of this study supported the hypothesis that both psychopathological and cognitive mechanisms intervene in determining the effect of treatment on parenting in this clinical population. Moreover, the results stress the need to carefully consider each dyads characteristics in order to provide intervention protocol that are tailored on individual variability.

Planning interventions on parenting in the context of SUD

The objective of Chapter 5 was to present a proposal for a randomized wait-list controlled trial aimed at examining the efficacy of a parenting intervention on maternal behaviors in the context of SUD,

and at identifying which mechanisms could support/obstacle intervention effects. Specifically we presented a rationale for the adoption of the Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline (VIPP-SD ; Juffer et al., 2008), and evidence based protocol that has been proven effective in other at-risk samples (Juffer et al., 2017), with this clinical population. Additionally, based on prior literature and on the results of our previous studies, we identified the possible intervening cognitive mechanisms, controlling for psychopathological symptoms and other relevant variables. The study design was presented with detailed information and the possible empirical and clinical outcomes were described. Globally, the study protocol aspires to offer an effective treatment targeted at improving quality of parenting behaviors while concurrently considering how the different SUD-related characteristics that we examined during the previous chapters might affect intervention effect.

Discussion

Parental SUD is a particularly complex condition, which could severely interfere with parental functioning and is associated to a higher risk of child maltreatment and poorer developmental outcomes in offspring (Dunn et al., 2002; Niccols et al., 2012). As we have extensively outlined during the previous chapters, these effects might be due to direct exposure of substances in utero, that affects physical, emotional, and neurodevelopmental growth, or to indirect effects that substance misuse can have on parental practices, further exacerbating the sequelae subsequent to prenatal assumption (Spehr et al., 2017; Tronick et al., 2005). In both these cases, it becomes relevant the role of attitudes and motivations that the individual exhibits towards care and parenthood. These characteristics are primarily observable through the (future) parent's behaviors. Observational studies provide evidence that, through the activation of specific brain circuits (Kim et al., 2010; Swain, 2011), parental representations (Pederson et al., 1998) and motivations (Nachoum et al., 2021), pregnancy triggers unique prenatal parenting behaviors that may be precursors of their earliest communicational competencies with their future children (Darwiche et al., 2016). In SUD

pregnancies, these behaviors refer also to the possibility to protect the fetus, interrupting substances consumption, adopting regular lifestyles, attending medical visits and seeking for help with respect to the condition of misuse (Kuczkowski, 2007). In this, quality of parenting is already observable during gestation (Glover & Capron, 2017) and should be addressed subsequently with specific interventions (Jones, 2006). In other words, to some extent, the direct effects of substances can be conceptualized as a consequence of inadequate prenatal care, for the self and for the embryo (De Palo, 2016). A growing body of research highlights that symptoms of psychopathology and other experiences of stress can have a direct effect on prenatal parenting and on the development of the fetus (Glover & Capron, 2017; Heron et al., 2004). The environment in the womb, during different sensitive periods for specific outcomes, can alter fetal wellbeing, with long lasting effects on the child (Barker, 1990). This seems particularly true for the context of parental SUD, where intrauterine growth is threatened by the placental transmission of substances to the fetus (Domenici et al., 2009), and different additional psycho-social risk factors are likely to be present (Hans, 1999; Marjukka Pajulo et al., 2008; Suchman & Luthar, 2000). In this, medical professionals providing prenatal services have a unique opportunity to engage pregnant women with SUD in drug treatment services during a sensitive period (Hall et al., 2013).

Unfortunately, prenatal drug exposure is not always identified, given that substance-related problems in fetuses and newborns can at times be subtle and not easily identifiable (Konijnenberg, 2015), and due to the tendency of pregnant women to underreport substance misuse (Kelly et al., 2001) or to the presence of substance of abuse which are legal (Slotkin, 1998). In all those cases, infants and children are referred to specialists and child protective services later in childhood, after having experienced for prolonged time a wide array of possible risk factors, including inadequate parenting practices, reiterated substance use, domestic violence, co-occurring mental illness, and an unsafe home environments (Choenni et al., 2015; Prindle et al., 2018). A growing number of studies highlight the need to provide comprehensive programs for mothers with SUD in these situations, in order to improve parental and child outcomes (Niccols et al., 2010). Such programs should not only

be addressed to substance misuse per se, but need also to target maternal mental wellbeing, parenting abilities, and child welfare through specialized treatments, parenting programs, and child-centered services (Niccols et al., 2012; Stein & Harold, 2015). Such interventions have been proved to enhance several outcomes as parenting quality, child developmental and behavioral adjustment (Belt et al., 2012; Niccols et al., 2012; Suchman et al., 2012).

The series of study reported in the present dissertation mostly focused on mother-child pairs referred to professionals after pregnancy, providing some insights on quality of parenting and of parent-child relationships in the post-natal period. Although confirming the high risk of experiencing difficulties during parenting practices, our first study highlighted the need to specifically characterize them, identifying profiles of dyadic functioning that consider how different features of maternal and child behavior interact together. The experience of positive relationships with caregivers enable children to appropriately regulate their emotional experience, holding an accessible and empathic attitude toward others, and supporting their development (Biringen et al., 2005; van Der Voort et al., 2014). Previous studies highlighted the need to appropriately identify a good fit between parent and child characteristics, given that each of them contributes to the quality of the relationship (Easterbrooks et al., 2005; Putnam et al., 2002; Sameroff, 1975). In our study we found different patterns of asynchrony between mother and child, stressing the need for a specific help for becoming attuned with their children in this clinical group. This is in line with previous work highlighting the need to adopt a relational approach when supporting parenting in the context of SUD, supporting bonding and relationship quality (Suchman, Pajulo, DeCoste, et al., 2006). Notably, in our group only a small number of dyads presented functional emotional attunement; both mothers and children of the group that we labelled “functioning dyads” were more connected to each other, being reciprocally responsive and involving. Anyway, as it was possible to observe, also in this group we could find the presence of inconstancies during interactions, suggesting the need to identify also subtle vulnerabilities, which should be carefully considered during clinical work in order to support them and to align them with already existing relational strengths.

Our second and third study supported the need to characterize parenting behaviors in the context of maternal SUD also in the light of parental individual functioning, considering mental wellbeing and cognitive resources. Our second study confirmed that the presence of additional psychopathology co-occurring with the condition of substance misuse could further exacerbate parental difficulties during mother-child interactions. The presence of psychopathological symptoms in the parent, both in the prenatal (van Den Bergh et al., 2005) and in the postnatal period (Murray et al., 2010; Ramchandani & Stein, 2003) has been widely associated to disturbances in child development. That is true both in the case of psychiatric diagnosis, intended as categorical classifications subsequent to a series of specific diagnostic criteria met, and in the case of psychopathological symptoms, intended as dimensional entities which rather describe emotional and/or behavioral disturbances and that can be present with different intensity in each individual (Zahn-Waxler et al., 2002). Still has to be determined whether this outcome is linked to the direct effects of psychopathology on the fetus, to genetic confounds or to the persistence of parental symptoms in time (Batenburg-Eddes et al., 2013) and the mechanisms through which parental psychopathology affect child outcomes are heterogeneous (Stein & Harold, 2015). Besides the different genetic and environmental factors involved in the link between parental mental health and children's developmental difficulties, vast literature highlights that quality of parenting represents an important mediating variable (Murray et al., 2010, 2015) and should thus be targeted through appropriate interventions, also considering the effect that different psychopathological symptoms could have on them. In the cases where additional psychopathology is present, the possibility to treat parental psychiatric difficulties contribute to better outcomes for the child and the family (Weissman et al., 2006).

Our third study provided further insights into the individual characteristics of the parent that could affect quality of parenting behaviors and treatment outcomes in mothers with SUD, identifying different trajectories in parent-child relationships according to cognitive functioning. There is growing evidence that individual variance in cognitive functioning plays an important role in the cognitive processes that supports parents' self-regulation of emotions and behaviors and that it is

linked with quality of caregiving practices (Barrett & Fleming, 2011; Ochsner & Gross, 2008). Mothers with better executive functioning are less likely to present dysfunctional parenting practices, with a reduced risk to respond with harsh negativity to child behavioral problems (Deater-Deckard, et al., 2012). A growing body of literature highlights that disturbed parental cognitions, both due to neuropsychological deficits and to the presence of psychopathology can act as mechanisms of intergenerational transmission of parental psychopathology (Stein & Harold, 2015). In these cases parental attention to child's signals is narrowed, preventing the possibility to correctly perceive and respond to them (Stein & Harold, 2015). This result was confirmed also in the context of parental SUD (Håkansson et al., 2018b; Porreca et al., 2018). Whenever cognitive difficulties or neuropsychological deficits are present, it is critical to provide parents with the help necessary to attend the child's communication, supporting the focus of their attention and the readability of facial cues, emotional signaling, behavioral and linguistic communication, in order to enhance appropriate comprehension and responses to those cues (Stein, 2012; Stein et al., 2009). Moreover, our data support the fact that cognitive impairments might affect treatment outcomes, in line with previous studies indicating that individuals with SUD exhibiting lower cognitive functioning are at higher risk for treatment dropout in complex treatment due to difficulties in the acquisition of new coping behaviors (McCrary & Smith, 1986) or learning and retention of new material (Aharonovich et al., 2006; Alterman et al., 1986).

Previous authors pointed out that treating substance misuse is not sufficient to achieve improvements in quality of parenting (Bosk et al., 2019; Catalano et al., 1999; Espinet et al., 2016; Suchman et al., 2012) and specific interventions should be specifically targeted at improving parent-child interactions and child outcomes (Suchman, Pajulo, DeCoste, et al., 2006). Together with previous literature (Aharonovich et al., 2006; Suchman et al., 2012), the results of our studies support the need to identify treatments that are tailored on the needs of this clinical population, targeting parental functioning while considering also how SUD-related difficulties might support/obstacle intervention effects. These data guided us during the implementation of the study protocol presented

in the last chapter, supporting the choice to adopt an intervention that emphasizes the emotional quality of the relationship between parent and child as the mechanism that promotes optimal child development (Suchman, Pajulo, DeCoste, et al., 2006), and that presents structural characteristics that might be coherent with the cognitive impairments of individuals with SUD (Aharonovich et al., 2006). The proposal of this research design represents an implementation of the results of the studies presented in this dissertation, moving from the level of assessment and investigation to the level of intervention. Accordingly to the results of study 1 (Chapter 2), the intervention proposed targets different parental dimensions and, although following pre-established themes, is tailored on the specific characteristics of each mother-child dyad, supporting already existing strengths. The possibility to approach parents in an empathetic, non-judgmental, and supportive way has been highlighted as a mean to promote a more engaged, open, and trusting relationship during treatment (Smith et al., 2016). Moreover, as an extension of the results of study 2 (Chapter 3) and study 3 (Chapter 4), the proposed research design aims to specifically investigate the role of parental cognitive mechanisms, controlling for the effect of maternal psychopathology. The study is currently ongoing and its future results will provide important insights into the cognitive, psychopathological, and behavioral mechanisms involved in parental SUD, with relevant implications for research and practice.

Intrauterine and childhood exposure in the home to parental SUD are a societal financial burden, with long-term financial costs of parental drug exposure on children including initial hospitalization, readmission, continued developmental therapy or mental therapy, and child protective services involvement (França et al., 2015). This clinical condition has an effect on the physical, developmental, and mental health of the pediatric population nationwide and raises questions of safety when these children remain in the care of opioid-addicted parents (Smith et al., 2016). Moreover, this condition raises serious concerns about parental health (Peacock et al., 2018), as well as parental caregiving abilities (Bauman & Levine, 1985). A continued screening of women with SUD problems in child-bearing age is essential starting from pregnancy and later on. In

circumstances where a child exhibits signs and symptoms associated to substance exposure or to substance-related risk factors, as child maltreatment, child protection represents a continuing concern for the professional involved (Gray et al., 2009; Stein & Harold, 2015). Strengthening community responses and family resources, and offering comprehensive treatments is critical to support this vulnerable condition (Niccols et al., 2012). Further work is needed to understand the role of the different aspects involved in this clinical condition and to create clinical practice guidelines for treatment that ponder the weight of these same mechanisms (Spehr et al., 2017).

Limitations

The present dissertation has a series of limitations. The first limitation of the presented studies involves the limited sample size of the participants, which prevents us from the generalization of the obtained results. Future investigations should include a larger number of participants, in order to be able to replicate and further expand the results of the present study. This limitation motivated our methodological choice to adopt preliminary power analysis in the study protocol presented in Chapter 5, in order to be able to detect the desired effects (Cohen, 1992).

The second limitation that we previously mentioned involves the lack of a low-risk control group in the studies presented, which prevents us from the possibility to understand whether the dynamics involving interactive, cognitive, and psychopathological mechanisms present similar characterizations in low-risk and high-risk conditions. Future research should further investigate the research questions presented in normative samples, which are usually characterized by lower rates of cognitive impairments, psychological distress, and higher quality of parenting behaviors. This could help to better understand whether the impact of cognitive functioning and psychopathology on quality of parenting and of parent-child relationships is similar across groups or whether different paths and trajectories are present.

A third limitation concerns the lack of measures specifically focused on personality, which

represents another crucial theme in the context of substance misuse (Allen & Laborde, 2020; Fehrman et al., 2019). In the studies presented we mainly focused on parents' distress and psychopathological symptoms, which have been often been identified as transversal to different personality traits. Anyway, given the frequent overlapping between personality disorders and substance misuse, future research should specifically focus on these aspects, in order to ascertain whether different personality traits characterize different patterns of parenting behaviors.

Finally, a limitation resides in the absence of additional measures aimed at investigating children's characteristics, as for example temperament, developmental difficulties, or the presence of emotional and behavioural problems. This aspect could be particularly interesting given the transactional dynamics that characterize parent-child relationships (Sameroff, 1975; Seifer et al., 1996) and the fact that prenatal drug exposure is often linked to specific characteristics in offspring (Bandstra et al., 2010; Tronick et al., 2005). Future research should further consider the role played by children characteristics in this clinical population.

Directions for future research

Future research with larger sample sizes and several time points of measurements could allow investigating more complex models with respect to the variables of interest. For example, it would be interesting to observe whether the behavioural patterns of interaction that we identified in Chapter 2 modify over time or determine different patterns of change during treatment. At the same time, it would be of interest to better understand how cognitive and psychopathological aspects change over time and how these changes might affect parent and child outcomes. Recent research in neuroscience highlights that parenting interventions can have an effect on the neurobiological mechanisms involved in parental sensitivity, further intervening on treatment outcomes (Bernard et al., 2015; Koliijn et al., 2020), and further stimulating the investigation of how individual parental mechanisms influence the effect of the intervention.

On the other hand, it would be of particular interest to observe the weight of children characteristics in modulating the findings that we found in the studies presented. For example, the literature has extensively provided evidence of the fact that individual differences in the experience of parenting behaviors could be associated to child developmental outcomes, as for example children's executive functions (Bernier et al., 2010) or emotional wellbeing (van Der Voort et al., 2014). It would be interesting to observe how these characteristics in the child are associated to quality of care and whether they modulate treatment outcomes. Moreover, given evidences of the lasting effects of epigenetic changes on gene expression in biological systems related to substance use (Knopik et al., 2019), it would be intriguing to additionally explore the role of genes on substance-related outcomes and with respect to treatment. Recent research highlights that children may be differentially susceptible to interventions effects depending on genetic variability (Bakermans-Kranenburg et al., 2008).

Likewise, it would be interested to examine whether the same results would be found with fathers. There is a growing body of literature that highlights how fathers exert a fundamental role in children development, presenting specific neurobiological and relational characteristics (Bakermans-Kranenburg et al., 2019; Lambert, 2012). Different studies pointed out that mothers with SUD are more likely to be single parents and, thus, to be the primary/only figure taking care of the child during the first years of life (e.g. (Conners et al., 2004). Furthermore, in part linked to this aspect, health policy strategies have mainly focused on mothers where parenthood occurred in the context of SUD, developing highly specialized treatments which are primarily targeted at women-child pairs and that, only to a lesser extent involve fathers in rehabilitation programs (Stover et al., 2012). It would be intriguing to further shed lights on quality of fathering and the mechanisms involved.

Finally, future research should become more skilled in moving “across time”, identifying appropriate screening protocols that could help to preventively identify pregnant women that struggle with substance misuse, and subsequently intervene (Belt et al., 2012). In parallel, research and intervention protocols should also be effective in finding adequate assessment and treatment

techniques for helping older children who have longer experienced the adverse outcomes of parental drug addiction and being exposed to difficult parent-child relationships. In this, new technologies could be particularly helpful, given their ability to capture more subtle behavioural indexes that point out to less evident difficulties in parent-child relationships. During the course of this doctoral project we moved towards this direction, developing a project aimed to integrate computer vision systems and observational grids in the identification of dysfunctional parent-child interactions (see Project 1 appendix). On the other hand, new technologies represent a particular appealing tool to engage older children in treatment and much work has already been done with other fragile populations

Clinical implications of the work

The present dissertation presents some implications for research, clinical and public health policies. Mothers with SUD should be provided comprehensive programs that target their psychological needs (Howell et al., 1999; Nair et al., 2003), the condition of addiction, psychiatric problems (Ingersoll et al., 2004), and parenting requirements (Niccols et al., 2010, 2012; Suchman, DeCoste, Castiglioni, et al., 2010). Quality of parenting behaviors occurring at home and educational environments could be important mediators of the adverse effects subsequent prenatal substance exposures and should be properly addressed (Spehr et al., 2017). Thus, it is important to properly identify relational difficulties and to support already existing strengths. Moreover, quality of parenting is likely to be influenced by individual and environmental characteristics (Hans, 1999; Suchman & Luthar, 2000), which should be carefully considered during assessment and implementations of interventions. From a research point of view, the studies presented in this work provided further insights with respect to the cognitive and psychopathological mechanisms involved in parenting behaviors, and in parenting interventions in mothers with SUD. As we have seen in Chapter 2, although challenges in quality of parenting and parent-child relationships are more likely to be present in this clinical group, they are characterized through different interactive patterns. Moreover, as evidenced in Chapters 3 and 4, some individual mechanisms of the parent, as cognitive

resources and psychopathological symptoms, are likely to shape quality of behaviors and the effect of treatment. This results stress the importance to further investigate these associations through rigorous and scientific methodologies, that could help to better understand the direction of the extant relationships, excluding the confounding effect of intervening variables (Sibbald & Roland, 1998). This evidence motivated the choice of the research design that we presented in Chapter 5, whose results will provide further relevant information on this topic.

From a clinical point of view, the results of this dissertation could be helpful for professional working in residential and outpatient facilities treating parents with substance misuse. The results of Chapter 2 could enhance their sensitivity to the differential characterization of mother-child relationships across this group, supporting the possibility to reach a global view of relationship quality, integrating both difficulties and strengths of each mother-child pair. Concurrently, data emerging from Chapter 3 and Chapter 4 could sensitize professionals and clinicians to individual factors intervening in modulating the characterization of parenting behaviors. In this sense, information inherent severity of psychological distress and executive functioning can be systematically included in assessments protocol and further considered during treatment administration. This possibility can be facilitated by the study protocol described in Chapter 5, where we propose an evidence-based intervention protocol that could be adaptable to the distinguishing features of each parent-child dyad, and that presents a series of structural characteristics that appear particularly suitable for this clinical group. This intervention, which is manualized, brief, and sustainable, can be extended to different facilities and administered parallel to treatments specifically targeted at the conditions of addiction and abuse. Moreover, given the focus on the enhancement of positive parenting strategies, this intervention could be useful for building a solid therapeutic alliance with substance using mothers. It has been previously stressed that these women need specialized programs that offer safe environments where they can build relationships with specialized personnel, which are characterized by safety and continuity (Belt et al., 2012; Luthar et al., 2007; Suchman, DeCoste, Castiglioni, et al., 2010). Remaining in treatment and the decrease of substance use

represents two of the main outcomes for effective treatment in maternal SUD (Belt et al., 2012). Notably, the provision of parenting interventions increases success in reduction of substance abuse and treatment completion (Catalano et al., 1999; Suchman, DeCoste, Castiglioni, et al., 2010), which are linked to longer post-treatment abstinence (Connors et al., 2006).

With respect to public health policies, the possibility to integrate the results of the present dissertation with clinical practices could contribute to the reduction of social costs subsequent to the condition of substance misuse. Specifically, improving services that specifically target parenting quality and parent-child relationships could help to prevent undesired developmental outcomes in offspring exposed to substances in utero or in the home (Niccols et al., 2012; Spehr et al., 2017). Finally, the results presented in the previous chapters could help to sensitize professionals to the emotional and relational aspects involved in parenting interventions, which should be one of the main focus of work with this fragile group, rather than the strengthening of skills and basic caring strategies per se (Parolin & Simonelli, 2016; Suchman et al., 2004).

Conclusions

The main objective of this thesis was to provide further knowledge on quality of parenting in mothers with SUD, investigating parenting behaviors, their associations with psychopathological symptoms and cognitive functioning, and how all these mechanisms intervene and are modified by parenting interventions. The results confirmed that SUD represents a risk condition for parenting and quality of parent-child relationships. Patterns of mother-child interactive behaviors are more likely to present difficulties within this group, but these are subjected to variability. Differences in quality of parenting behaviors are linked to the presence of co-occurring psychopathology and cognitive resources, and these two mechanisms play an important role in the ongoing of interventions. Thus, quality of parenting behaviors should represent one of the main focuses of assessment and intervention in mothers with SUD, but they should be considered also in the light of psychopathology and cognitive functioning.

References

- Abbott, R., Dunn, V. J., Robling, S. A., & Paykel, E. S. (2004). Long-term outcome of offspring after maternal severe puerperal disorder. *Acta Psychiatrica Scandinavica*, *110*(5), 365–373. <https://doi.org/10.1111/J.1600-0447.2004.00406.X>
- Abidin, R. R. (1990). *Parenting stress index - short form*. Pediatric Psychology Press.
- Adamson, L. B., & Bakeman, R. (1984). Mothers' communicative acts: changes during infancy. *Infant Behavior and Development*, *7*(4), 467–478. [https://doi.org/10.1016/S0163-6383\(84\)80006-5](https://doi.org/10.1016/S0163-6383(84)80006-5)
- Aharonovich, E., Hasin, D. S., Brooks, A. C., Liu, X., Bisaga, A., & Nunes, E. V. (2006). Cognitive deficits predict low treatment retention in cocaine dependent patients. *Drug and Alcohol Dependence*. <https://doi.org/10.1016/j.drugalcdep.2005.08.003>
- Aharonovich, E., Nunes, E., & Hasin, D. (2003). Cognitive impairment, retention and abstinence among cocaine abusers in cognitive-behavioral treatment. *Drug and Alcohol Dependence*. [https://doi.org/10.1016/S0376-8716\(03\)00092-9](https://doi.org/10.1016/S0376-8716(03)00092-9)
- Ahrnberg, H., Korja, R., Scheinin, N. M., Nolvi, S., Kataja, E. L., Kajanoja, J., Hakanen, H., Karlsson, L., Karlsson, H., & Karukivi, M. (2021). Maternal Alexithymic Traits Are Related to Lower Maternal Sensitivity and Higher Hostility in Maternal Caregiving Behavior—The FinnBrain Birth Cohort Study. *Frontiers in Psychology*, *12*, 704036. <https://doi.org/10.3389/FPSYG.2021.704036>
- Ainsworth, M. D. S. (1969). Maternal sensitivity scales. *Power*, *6*, 1379–1388.
- Ainsworth, M. D. S., Bell, S. M., & Stayton, D. F. (1974). Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In M. P. M. Richards (Ed.), *The integration of a child into a social world* (pp. 99–135). Cambridge University Press. <https://psycnet.apa.org/record/1975-07118-004>
- Ainsworth, M. D. S., Bell, S. M., & Stayton, D. J. (1971). Individual differences in Strange Situation behaviour of one-year-olds. In H. R. Schaffer (Ed.), *The origins of human social relations* (Issues 5–6, pp. 17–57). Academic Press. <https://doi.org/10.1080/14616734.2013.835128>
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. N. (1978). *Patterns of attachment: A psychological study of the strange situation*. Lawrence Erlbaum Associates.
- Alcaro, A., Huber, R., & Panksepp, J. (2007). Behavioral functions of the mesolimbic dopaminergic system: An affective neuroethological perspective. *Brain Research Reviews*, *56*(2), 283–321. <https://doi.org/10.1016/j.brainresrev.2007.07.014>
- Allen, M. S., & Laborde, S. (2020). A prospective study of personality and illicit drug use in Australian adults. *Personality and Individual Differences*, *163*, 110048. <https://doi.org/10.1016/J.PAID.2020.110048>
- Alterman, A. I., Bridges, K. R., & Tarter, R. E. (1986). The Influence of Both Drinking and Familial Risk Statuses on Cognitive Functioning of Social Drinkers. *Alcoholism: Clinical and Experimental Research*. <https://doi.org/10.1111/j.1530-0277.1986.tb05122.x>
- Ammerman, R. T., Kolko, D. J., Kirisci, L., Blackson, T. C., & Dawes, M. A. (1999). Child abuse potential in parents with histories of substance use disorder. *Child Abuse & Neglect*, *23*(12), 1225–1238. [https://doi.org/10.1016/S0145-2134\(99\)00089-7](https://doi.org/10.1016/S0145-2134(99)00089-7)
- Andersson, H. W., Wenaas, M., & Nordfjærn, T. (2019). Relapse after inpatient substance use treatment: A prospective cohort study among users of illicit substances. *Addictive Behaviors*. <https://doi.org/10.1016/j.addbeh.2018.11.008>
- Andrews, K., Atkinson, L., Harris, M., & Gonzalez, A. (2021). Examining the effects of household chaos on

child executive functions: A meta-analysis. *Psychological Bulletin*, 147(1), 16–32.
<https://doi.org/10.1037/BUL0000311>

- APA. (2013). American Psychiatric Association, 2013. Diagnostic and statistical manual of mental disorders (5th ed.). In *American Journal of Psychiatry*.
<https://doi.org/10.1176/appi.books.9780890425596.744053>
- Armstrong, M. A., Gonzales Osejo, V., Lieberman, L., Carpenter, D. M., Pantoja, P. M., & Escobar, G. J. (2003). Perinatal Substance Abuse Intervention in Obstetric Clinics Decreases Adverse Neonatal Outcomes. *Journal of Perinatology* 2003 23:1, 23(1), 3–9. <https://doi.org/10.1038/sj.jp.7210847>
- Ashman, S. B., Dawson, G., Panagiotides, H., Yamada, E., & Wilkinson, C. W. (2002). Stress hormone levels of children of depressed mothers. *Development and Psychopathology*, 14(2), 333–349.
<https://doi.org/10.1017/S0954579402002080>
- Bada, H. S., Das, A., Bauer, C. R., Shankaran, S., Lester, B., LaGasse, L., Hammond, J., Wright, L. L., & Higgins, R. (2007). Impact of prenatal cocaine exposure on child behavior problems through school age. *Pediatrics*, 119(2), e348–e359. <https://doi.org/10.1542/peds.2006-1404>
- Bagby, R. M., Parker, J. D. A., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia scale—I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, 38(1), 23–32.
[https://doi.org/10.1016/0022-3999\(94\)90005-1](https://doi.org/10.1016/0022-3999(94)90005-1)
- Baker, P. L., & Carson, A. (1999). I take care of my kids: Mothering practices of substance-abusing women. *Gender and Society*. <https://doi.org/10.1177/089124399013003005>
- Bakermans-Kranenburg, M. J., Lotz, A., Alyousefi-van Dijk, K., & van IJzendoorn, M. (2019). Birth of a Father: Fathering in the First 1,000 Days. *Child Development Perspectives*.
<https://doi.org/10.1111/cdep.12347>
- Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2003). Less is More: Meta-Analyses of Sensitivity and Attachment Interventions in Early Childhood. *Psychological Bulletin*.
<https://doi.org/10.1037/0033-2909.129.2.195>
- Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Pijlman, F. T. A., Mesman, J., & Juffer, F. (2008). Experimental Evidence for Differential Susceptibility: Dopamine D4 Receptor Polymorphism (DRD4 VNTR) Moderates Intervention Effects on Toddlers' Externalizing Behavior in a Randomized Controlled Trial. *Developmental Psychology*, 44(1), 293–300. <https://doi.org/10.1037/0012-1649.44.1.293>
- Bandstra, E. (2002). Longitudinal influence of prenatal cocaine exposure on child language functioning. *Neurotoxicology and Teratology*, 24(3), 297–308. [https://doi.org/10.1016/S0892-0362\(02\)00192-7](https://doi.org/10.1016/S0892-0362(02)00192-7)
- Bandstra, E. S., Morrow, C. E., Mansoor, E., & Accornero, V. H. (2010). Prenatal drug exposure: infant and toddler outcomes. *Journal of addictive diseases*, 29(2), 245-258.
<https://doi.org/10.1080/10550881003684871>
- Barker, D. J. (1990). The fetal and infant origins of adult disease. *BMJ: British Medical Journal*, 301(6761), 1111. <https://doi.org/10.1136/BMJ.301.6761.1111>
- Barnard, M., & McKeganey, N. (2004). The impact of parental problem drug use on children: What is the problem and what can be done to help? In *Addiction* (Vol. 99, Issue 5, pp. 552–559). John Wiley & Sons, Ltd. <https://doi.org/10.1111/j.1360-0443.2003.00664.x>
- Barone, L., Barone, V., Dellagiulia, A., & Lionetti, F. (2018). Testing an Attachment-Based Parenting Intervention-VIPP-FC/A in Adoptive Families with Post-institutionalized Children: Do Maternal Sensitivity and Genetic Markers Count? *Frontiers in Psychology*, 9(FEB), 156.
<https://doi.org/10.3389/fpsyg.2018.00156>
- Barone, L., & Carone, N. (2020). Childhood abuse and neglect experiences, Hostile-Helpless attachment, and reflective functioning in mentally ill filicidal mothers. *Attachment and Human Development*.

<https://doi.org/10.1080/14616734.2020.1738510>

- Barone, L., Ozturk, Y., & Lionetti, F. (2019). The key role of positive parenting and children's temperament in post-institutionalized children's socio-emotional adjustment after adoption placement. A RCT study. *Social Development, 28*(1), 136–151. <https://doi.org/10.1111/sode.12329>
- Barrett, J., & Fleming, A. S. (2011). Annual research review: All mothers are not created equal: neural and psychobiological perspectives on mothering and the importance of individual differences. In *Journal of Child Psychology and Psychiatry and Allied Disciplines*. <https://doi.org/10.1111/j.1469-7610.2010.02306.x>
- Barrett, L. F., Tugade, M. M., & Engle, R. W. (2004). Individual differences in working memory capacity and dual-process theories of the mind. *Psychological Bulletin, 130*(4), 553–573. <https://doi.org/10.1037/0033-2909.130.4.553>
- Batenburg-Eddes, T. Van, Brion, M. J., Henrichs, J., Jaddoe, V. W. V., Hofman, A., Verhulst, F. C., Lawlor, D. A., Smith, G. D., & Tiemeier, H. (2013). Parental depressive and anxiety symptoms during pregnancy and attention problems in children: a cross-cohort consistency study. *Journal of Child Psychology and Psychiatry, 54*(5), 591–600. <https://doi.org/10.1111/JCPP.12023>
- Bates, M. E., Bowden, S. C., & Barry, D. (2002). Neurocognitive impairment associated with alcohol use disorders: Implications for treatment. In *Experimental and Clinical Psychopharmacology*. <https://doi.org/10.1037/1064-1297.10.3.193>
- Bauer, W. D., & Twentyman, C. T. (1985). Abusing, Neglectful, and Comparison Mothers' Responses to Child-Related and Non-Child-Related Stressors. *Journal of Consulting and Clinical Psychology*. <https://doi.org/10.1037/0022-006X.53.3.335>
- Bauman, P. S., & Dougherty, F. E. (1983). Drug-Addicted Mothers' Parenting and Their Children's Development. *International Journal of the Addictions, 18*(3), 291–302. <https://doi.org/10.3109/10826088309039348>
- Bauman, P. S., & Levine, S. A. (1985). The Development of Children of Drug Addicts. *International Journal of the Addictions, 21*(8), 849–863. <https://doi.org/10.3109/10826088609027399>
- Bauman, P. S., & Levine, S. A. (1986). The Development of Children of Drug Addicts. *International Journal of the Addictions, 21*(8), 849–863. <https://doi.org/10.3109/10826088609027399>
- Bays, J. (1990). Substance Abuse and Child Abuse: Impact of Addiction on the Child. *Pediatric Clinics of North America, 37*(4), 881–904. [https://doi.org/10.1016/S0031-3955\(16\)36941-3](https://doi.org/10.1016/S0031-3955(16)36941-3)
- Beckwith, L., Howard, J., Espinosa, M., & Tyler, R. (1999). Psychopathology, mother-child interaction, and infant development: Substance-abusing mothers and their offspring. *Development and Psychopathology*. <https://doi.org/10.1017/S095457949900228X>
- Beebe, B. (2006). Co-constructing mother–infant distress in face-to-face interactions: Contributions of microanalysis. *Infant Observation, 9*(2), 151–164. <https://doi.org/10.1080/13698030600810409>
- Beebe, B., & Lachmann, F. (2002). Organizing Principles of Interaction from Infant Research and the Lifespan Prediction of Attachment: Application to Adult Treatment. *Journal of Infant, Child, and Adolescent Psychotherapy, 2*(4), 61–89. <https://doi.org/10.1080/15289168.2002.10486420>
- Beebe, B., & Lachmann, F. M. (1998). Co-constructing inner and relational processes: Self- and mutual regulation in infant research and adult treatment. In *Psychoanalytic Psychology* (Vol. 15, Issue 4, pp. 480–516). American Psychological Association Inc. <https://doi.org/10.1037/0736-9735.15.4.480>
- Beeghly, M., & Tronick, E. Z. (1994). Effects of prenatal exposure to cocaine in early infancy: Toxic effects on the process of mutual regulation. *Infant Mental Health Journal, 15*(2), 158–175. [https://doi.org/10.1002/1097-0355\(199422\)15:2<158::AID-IMHJ2280150207>3.0.CO;2-7](https://doi.org/10.1002/1097-0355(199422)15:2<158::AID-IMHJ2280150207>3.0.CO;2-7)
- Behnke, M., & Smith, V. C. (2013). Prenatal Substance Abuse: Short- and Long-term Effects on the Exposed

Fetus. *Pediatrics*, 131(3), e1009–e1024. <https://doi.org/10.1542/peds.2012-3931>

- Bellinger, D. (1980). Consistency in the pattern of change in mothers' speech: some discriminant analyses*. *Journal of Child Language*, 7(3), 469–487. <https://doi.org/10.1017/S0305000900002798>
- Belsky, J., Fearon, R. M. P., & Bell, B. (2007). Parenting, attention and externalizing problems: testing mediation longitudinally, repeatedly and reciprocally. *Journal of Child Psychology and Psychiatry*, 48(12), 1233–1242. <https://doi.org/10.1111/J.1469-7610.2007.01807.X>
- Belsky, J., Newman, D. A., Widaman, K. F., Rodkin, P., Pluess, M., Fraley, R. C., Berry, D., Helm, J. L., & Roisman, G. I. (2015). Differential susceptibility to effects of maternal sensitivity? A study of candidate plasticity genes. *Development and Psychopathology*, 27(3), 725–746. <https://doi.org/10.1017/S0954579414000844>
- Belt, R. H., Flykt, M., Punamäki, R.-L., Pajulo, M., Posa, T., & Tamminen, T. (2012). Psychotherapy groups and individual support to enhance mental health and early dyadic interaction among drug-abusing mothers. *Infant Mental Health Journal*, 33(5), 520–534. <https://doi.org/10.1002/IMHJ.21348>
- Berg-Nielsen, T. S., Vikan, A., & Dahl, A. A. (2000). Parenting Related to Child and Parental Psychopathology: A Descriptive Review of the Literature: *Clinical Child Psychology and Psychiatry*, 7(4), 529–552. <https://doi.org/10.1177/1359104502007004006>
- Berg, E. A. (1948). A simple objective technique for measuring flexibility in thinking. *Journal of General Psychology*. <https://doi.org/10.1080/00221309.1948.9918159>
- Bergman, A. J., & Walker, E. (1995). The Relationship between Cognitive Functions and Behavioral Deviance in Children At Risk for Psychopathology. *Journal of Child Psychology and Psychiatry*, 36(2), 265–278. <https://doi.org/10.1111/J.1469-7610.1995.TB01824.X>
- Bernard, K., Simons, R., & Dozier, M. (2015). Effects of an Attachment-Based Intervention on Child Protective Services-Referred Mothers' Event-Related Potentials to Children's Emotions. *Child Development*, 86(6), 1673–1684. <https://doi.org/10.1111/cdev.12418>
- Bernier, A., Carlson, S. M., & Whipple, N. (2010). From External Regulation to Self-Regulation: Early Parenting Precursors of Young Children's Executive Functioning. *Child Development*, 81(1), 326–339. <https://doi.org/10.1111/j.1467-8624.2009.01397.x>
- Bernstein, V., Jeremy, R. J., Schuckit, S. L., & Marcus, J. (1984). A longitudinal study of offspring born to methadone-maintained women. II. Dyadic interaction and infant behavior at 4 months. *American Journal of Drug and Alcohol Abuse*. <https://doi.org/10.3109/00952998409002779>
- Bezdjian, S., Baker, L. A., Lozano, D. I., & Raine, A. (2009). Assessing inattention and impulsivity in children during the Go/NoGo task. *British Journal of Developmental Psychology*. <https://doi.org/10.1348/026151008X314919>
- Biederman, J., Petty, C., Faraone, S. V., Henin, A., Hirshfeld-Becker, D., Pollack, M. H., de Figueiredo, S., Feeley, R., & Rosenbaum, J. F. (2006). Effects of parental anxiety disorders in children at high risk for panic disorder: A controlled study. *Journal of Affective Disorders*, 94(1–3), 191–197. <https://doi.org/10.1016/J.JAD.2006.04.012>
- Bigelow, A. E., MacLean, K., Proctor, J., Myatt, T., Gillis, R., & Power, M. (2010). Maternal sensitivity throughout infancy: Continuity and relation to attachment security. *Infant Behavior and Development*, 33(1), 50–60. <https://doi.org/10.1016/J.INFBEH.2009.10.009>
- Biringen, Z. (2008). *The Emotional Availability (EA) scales and EA Zones Evaluation: Infancy/Early childhood version. Fourth Edition*. Boulder, CO: emotionalavailability.com
- Biringen, Z., Matheny, A., Bretherton, I., Renouf, A., & Sherman, M. (2000). Maternal representations of the self as parent: Connections with maternal sensitivity and maternal structuring. *Attachment & Human Development*, 2(2), 218–232.

- Biringen, Z., & Robinson, J. (1991). Emotional availability in mother-child interactions: a reconceptualization for research. *American Journal of Orthopsychiatry*, *61*(2), 258.
- Biringen, Z., Robinson, J., & Emde, R. (1998). *The Emotional Availability (EA) scales. Third Edition*. Boulder.
- Biringen, Z., Damon, J., Grigg, W., Mone, J., Pipp-Siegel, S., Skillern, S., & Stratton, J. (2005). Emotional availability: Differential predictions to infant attachment and kindergarten adjustment based on observation time and context. *Infant Mental Health Journal*, *26*(4), 295–308. <https://doi.org/10.1002/imhj.20054>
- Biringen, Z., Derscheid, D., Vliegen, N., Closson, L., & Easterbrooks, M. A. (2014). Emotional availability (EA): Theoretical background, empirical research using the EA Scales, and clinical applications. *Developmental Review*, *34*(2), 114–167. <https://doi.org/10.1016/j.dr.2014.01.002>
- Biringen, Z., & Easterbrooks, M. A. (2012). Emotional availability: Concept, research, and window on developmental psychopathology. *Development and Psychopathology*, *24*(01), 1–8. <https://doi.org/10.1017/S0954579411000617>
- Biringen, Z., & Robinson, J. (1991). Emotional availability in mother-child interactions: A reconceptualization for research. *American Journal of Orthopsychiatry*, *61*(2), 258–271. <https://doi.org/10.1037/h0079238>
- Black, M., Schuler, M., & Nair, P. (1993). Prenatal Drug Exposure: Neurodevelopmental Outcome and Parenting Environment. *Journal of Pediatric Psychology*, *18*(5), 605–620. <https://doi.org/10.1093/jpepsy/18.5.605>
- Blackwell, P. L., Lockman, J. J., & Kaiser, M. (1999). Mother-Infant Interaction in Drug-Affected Dyads Over the First 9 Months of Life. *Applied Developmental Science*, *3*(3), 168–177. https://doi.org/10.1207/s1532480xads0303_3
- Blashfield, R. K., & Aldenderfer, M. S. (1988). The Methods and Problems of Cluster Analysis. *Handbook of Multivariate Experimental Psychology*, 447–473. https://doi.org/10.1007/978-1-4613-0893-5_14
- Bloemen, A. J. P., Oldehinkel, A. J., Laceulle, O. M., Ormel, J., Rommelse, N. N. J., & Hartman, C. A. (2018). The association between executive functioning and psychopathology: general or specific? *Psychological Medicine*, *48*(11), 1787–1794. <https://doi.org/10.1017/S0033291717003269>
- Blom, E. H., Olsson, E., Serlachius, E., Ericson, M., & Ingvar, M. (2010). Heart rate variability (HRV) in adolescent females with anxiety disorders and major depressive disorder. *Acta Paediatrica*, *99*(4), 604–611. <https://doi.org/10.1111/J.1651-2227.2009.01657.X>
- Blow, F. C., Walton, M. A., Bohnert, A. S. B., Ignacio, R. V., Chermack, S., Cunningham, R. M., Booth, B. M., Ilgen, M., & Barry, K. L. (2017). A randomized controlled trial of brief interventions to reduce drug use among adults in a low-income urban emergency department: the HealthiER You study. *Addiction*. <https://doi.org/10.1111/add.13773>
- Boden, J. M., Fergusson, D. M., & Horwood, L. J. (2013). Alcohol misuse and criminal offending: Findings from a 30-year longitudinal study. *Drug and Alcohol Dependence*, *128*(1–2), 30–36. <https://doi.org/10.1016/j.drugalcdep.2012.07.014>
- Bornstein, M. H. (2002). Parenting infants. In Marc H. Bornstein (Ed.), *Handbook of parenting 1* (Second ed., pp. 3–44). Lawrence Erlbaum Associates.
- Bornstein, M. H., Putnick, D. L., & Suwalsky, J. T. D. (2018). Parenting cognitions → parenting practices → child adjustment? The standard model. *Development and Psychopathology*, *30*(2), 399–416. <https://doi.org/10.1017/S0954579417000931>
- Bornstein, M. H., Suwalsky, J. T. D., & Breakstone, D. A. (2012). Emotional relationships between mothers and infants: Knowns, unknowns, and unknown unknowns. In *Development and Psychopathology*. <https://doi.org/10.1017/S0954579411000708>

- Bornstein, M. H., Tamis-LeMonda, C. S., Hahn, C.-S., & Haynes, O. M. (2008). Maternal responsiveness to young children at three ages: Longitudinal analysis of a multidimensional, modular, and specific parenting construct. *Developmental Psychology, 44*(3), 867–874. <https://doi.org/10.1037/0012-1649.44.3.867>
- Bornstein, M. H., Tamis-LeMonda, C. S., Tal, J., Ludemann, P., Toda, S., Rahn, C. W., Pêcheux, M.-G., Azuma, H., & Vardi, D. (1992). Maternal Responsiveness to Infants in Three Societies: The United States, France, and Japan. *Child Development, 63*(4), 808–821. <https://doi.org/10.1111/J.1467-8624.1992.TB01663.X>
- Bornstein, Marc H. (2012). *Parenting Science and Practice Cultural Approaches to Parenting*. <https://doi.org/10.1080/15295192.2012.683359>
- Bosk, E. A., Paris, R., Hanson, K. E., Ruisard, D., & Suchman, N. E. (2019). Innovations in child welfare interventions for caregivers with substance use disorders and their children. *Children and Youth Services Review, 101*, 99–112. <https://doi.org/10.1016/j.childyouth.2019.03.040>
- Bowlby, J. (1969). Attachment and Loss. In *New York* (Issue July 2001). Basic books.
- Bowlby, John. (1982). Attachment and Loss: Retrospect and Prospect. *American Journal of Orthopsychiatry, 52*(4), 664–678. <https://doi.org/10.1111/j.1939-0025.1982.tb01456.x>
- Boyce, P. M. (2003). Risk factors for postnatal depression: a review and risk factors in Australian populations. *Archives of Women's Mental Health 2003 6:2, 6*(2), s43–s50. <https://doi.org/10.1007/S00737-003-0005-9>
- Brazelton, T. B. (1999). How to Help Parents of Young Children: The Touchpoints Model. *Journal of Perinatology, 19*(6), S6–S7. <http://www.stockton-press.co.uk>
- Bressi, C., Taylor, G., Parker, J., Bressi, S., Brambilla, V., Aguglia, E., Allegranti, I., Bongiorno, A., Giberti, F., Bucca, M., Todarello, O., Callegari, C., Vender, S., Gala, C., & Invernizzi, G. (1996). Cross validation of the factor structure of the 20-item Toronto Alexithymia Scale: An Italian multicenter study. *Journal of Psychosomatic Research, 41*(6), 551–559. [https://doi.org/10.1016/S0022-3999\(96\)00228-0](https://doi.org/10.1016/S0022-3999(96)00228-0)
- Bretherton, I. (2013). Revisiting Mary Ainsworth's conceptualization and assessments of maternal sensitivity-insensitivity. *Attachment & Human Development, 15*(5–6), 460–484. <https://doi.org/10.1080/14616734.2013.835128>
- Bridgett, D. J., Kanya, M. J., Rutherford, H. J. V., & Mayes, L. C. (2017). Maternal executive functioning as a mechanism in the intergenerational transmission of parenting: Preliminary evidence. *Journal of Family Psychology, 31*(1), 19–29. <https://doi.org/10.1037/fam0000264>
- Brooks, C. S., Zuckerman, B., Bamforth, A., Cole, J., & Kaplan-Sanoff, M. (1994). Clinical issues related to substance-involved mothers and their infants. *Infant Mental Health Journal, 15*(2), 202–217. [https://doi.org/10.1002/1097-0355\(199422\)15:2<202::AID-IMHJ2280150210>3.0.CO;2-A](https://doi.org/10.1002/1097-0355(199422)15:2<202::AID-IMHJ2280150210>3.0.CO;2-A)
- Brorson, H. H., Ajo Arnevik, E., Rand-Hendriksen, K., & Duckert, F. (2013). Drop-out from addiction treatment: A systematic review of risk factors. *Clinical Psychology Review, 33*(8), 1010–1024. <https://doi.org/10.1016/j.cpr.2013.07.007>
- Brouwers, E. P. M., Van Baar, A. L., & Pop, V. J. M. (2001). Maternal anxiety during pregnancy and subsequent infant development. *Infant Behavior and Development, 24*(1), 95–106. [https://doi.org/10.1016/S0163-6383\(01\)00062-5](https://doi.org/10.1016/S0163-6383(01)00062-5)
- Burgess, P. W., & Simons, J. S. (2012). Theories of frontal lobe executive function: Clinical applications. In *The Effectiveness of Rehabilitation for Cognitive Deficits*. <https://doi.org/10.1093/acprof:oso/9780198526544.003.0018>
- Cannon, T. D., Mednick, S. A., Parnas, J., Schulsinger, F., Praestholm, J., & Vestergaard, A. (1994). Developmental Brain Abnormalities in the Offspring of Schizophrenic Mothers: II. Structural Brain

Characteristics of Schizophrenia and Schizotypal Personality Disorder. *Archives of General Psychiatry*, 51(12), 955–962. <https://doi.org/10.1001/ARCHPSYC.1994.03950120027006>

- Cannon, T. D., Mednicer, S. A., Parnas, J., Schulsinger, F., Praestholm, J., & Vestergaard, A. (1993). Developmental Brain Abnormalities in the Offspring of Schizophrenic Mothers: I. Contributions of Genetic and Perinatal Factors. *Archives of General Psychiatry*, 50(7), 551–564. <https://doi.org/10.1001/ARCHPSYC.1993.01820190053006>
- Cao, Z., Simon, T., Wei, S.-E., & Sheikh, Y. (2016). Realtime Multi-Person 2D Pose Estimation using Part Affinity Fields. *CVPR*.
- Carr, A., & Pike, A. (2012). Maternal scaffolding behavior: Links with parenting style and maternal education. *Developmental Psychology*, 48(2), 543–551. <https://doi.org/10.1037/a0025888>
- Caruana, E. J., Roman, M., Hernández-Sánchez, J., & Solli, P. (2015). Longitudinal studies. *Journal of Thoracic Disease*, 7(11), E537. <https://doi.org/10.3978/J.ISSN.2072-1439.2015.10.63>
- Carvalho, M. E., Gratier, M., Salgado Carvalho, M. E., Rosado, J. M., Justo, M., Ferreira, H. M., & Da Silva, R. (2019). The Impact of Maternal Voice on the Fetus: A Systematic Review. *Current Women's Health Reviews*, 15, 196–206. <https://doi.org/10.2174/1573404814666181026094419>
- Carvalho, M. E. S., de Miranda Justo, J. M. R., Gratier, M., & da Silva, H. M. F. R. (2018). The Impact of Maternal Voice on the Fetus: A Systematic Review. *Current Women's Health Reviews*, 15(3), 196–206. <https://doi.org/10.2174/1573404814666181026094419>
- Casonato, M., Nazzari, S., & Frigerio, A. (2017). Feasibility and efficacy of an attachment-based intervention in a maltreatment sample in residential care: A pilot study. *Clinical Child Psychology and Psychiatry*, 22(4), 561–571. <https://doi.org/10.1177/1359104517719115>
- Cassidy, J., & Berlin, L. J. (1994). The Insecure/Ambivalent Pattern of Attachment: Theory and Research. *Child Development*, 65(4), 971–991. <https://doi.org/10.1111/J.1467-8624.1994.TB00796.X>
- Catalano, R. F., Gainey, R. R., Fleming, C. B., Haggerty, K. P., & Johnson, N. O. (1999). An experimental intervention with families of substance abusers: One-year follow-up of the focus on families project. *Addiction*. <https://doi.org/10.1046/j.1360-0443.1999.9422418.x>
- Challacombe, F. L., Salkovskis, P. M., Woolgar, M., Wilkinson, E. L., Read, J., & Acheson, R. (2016). Parenting and mother-infant interactions in the context of maternal postpartum obsessive-compulsive disorder: Effects of obsessional symptoms and mood. *Infant Behavior and Development*, 44, 11–20. <https://doi.org/10.1016/J.INFBEH.2016.04.003>
- Chance, T., & Scannapieco, M. (2002). Ecological Correlates of Child Maltreatment: Similarities and Differences Between Child Fatality and Nonfatality Cases. *Child and Adolescent Social Work Journal*, 19(2), 139–161. <https://doi.org/10.1023/A:1014598423396>
- Choenni, V., Hammink, A., & van de Mheen, D. (2015). Association Between Substance Use and the Perpetration of Family Violence in Industrialized Countries: A Systematic Review. *Trauma, Violence, & Abuse*, 18(1), 37–50. <https://doi.org/10.1177/1524838015589253>
- Clark, E. L. M., Jiao, Y., Sandoval, K., Biringen, Z., Clark, E. L. M., Jiao, Y., Sandoval, K., Biringen, Z., & Rodrigo, M. J. (2021). Neurobiological Implications of Parent–Child Emotional Availability: A Review. *Brain Sciences* 2021, Vol. 11, Page 1016, 11(8), 1016. <https://doi.org/10.3390/BRAINS11081016>
- Cleaver, H., Donald, N., Tarr, S., & Cleaver, D. (2007). *Child Protection, Domestic Violence and Parental Substance Misuse: Family Experiences and Effective Practice*. Jessica Kingsley Publishers.
- Cleland, C., Magura, S., Foote, J., Rosenblum, A., & Kosanke, N. (2005). Psychometric properties of the Toronto Alexithymia Scale (TAS-20) for substance users. *Journal of Psychosomatic Research*, 58(3), 299–306. <https://doi.org/10.1016/j.jpsychores.2004.11.002>

- Cohen, J. (1992). Statistical power analysis. *Current Directions in Psychological Science*, 1(3), 98–101.
- Cohn, J. E., Campbell, S. B., Matias, R., & Hopkins, J. (1990). Developmental Psychology Face-to-Face Interactions of Postpartum Depressed and Nondepressed Mother-Infant Pairs at 2 Months. *Developmental Psychology*, 26(1), 15–23.
- Cohn, J. F., Campbell, S. B., Matias, R., & Hopkins, J. (1990). Face-to-face interactions of postpartum depressed and nondepressed mother-infant pairs at 2 months. *Developmental Psychology*, 26(1), 15–23. <https://psycnet.apa.org/doiLanding?doi=10.1037%2F0012-1649.26.1.15>
- Cohn, J. F., & Tronick, E. Z. (1988). Mother-infant face-to-face interaction: Influence is bidirectional and unrelated to periodic cycles in either partner's behavior. *Developmental Psychology*, 24(3), 386–392. <https://doi.org/10.1037/0012-1649.24.3.386>
- Coles, C. D., & Platzman, K. A. (1993). Behavioral Development in Children Prenatally Exposed to Drugs and Alcohol. *International Journal of the Addictions*, 28(13), 1393–1433. <https://doi.org/10.3109/10826089309062192>
- Collins, A., & Koechlin, E. (2012). Reasoning, learning, and creativity: Frontal lobe function and human decision-making. *PLoS Biology*. <https://doi.org/10.1371/journal.pbio.1001293>
- Connell-Carrick, K. (2003). A Critical Review of the Empirical Literature: Identifying Correlates of Child Neglect. *Child and Adolescent Social Work Journal*, 20(5), 389–425. <https://doi.org/10.1023/A:1026099913845>
- Connors, N. A., Bradley, R. H., Mansell, L. W., Liu, J. Y., Roberts, T. J., Burgdorf, K., & Herrell, J. M. (2004). Children of Mothers with Serious Substance Abuse Problems: An Accumulation of Risks. *American Journal of Drug and Alcohol Abuse*. <https://doi.org/10.1081/ADA-120029867>
- Connors, N. A., Grant, A., Crone, C. C., & Whiteside-Mansell, L. (2006). Substance abuse treatment for mothers: Treatment outcomes and the impact of length of stay. *Journal of Substance Abuse Treatment*, 31(4), 447–456. <https://doi.org/10.1016/J.JSAT.2006.06.001>
- Conroy, D. A., & Arnedt, J. T. (2014). Sleep and Substance Use Disorders: An Update. *Current Psychiatry Reports*, 16, 487. <https://doi.org/10.1007/s11920-014-0487-3>
- Corsi, P. M. (1973). Human memory and the medial temporal region of the brain. In *Dissertation Abstracts International*.
- Couwenbergh, C., Van Den Brink, W., Zwart, K., Vreugdenhil, C., Van Wijngaarden-Cremers, P., & Van Der Gaag, R. J. (2006). Comorbid psychopathology in adolescents and young adults treated for substance use disorders: A review. In *European Child and Adolescent Psychiatry*. <https://doi.org/10.1007/s00787-006-0535-6>
- Crandall, A. A., Deater-Deckard, K., & Riley, A. W. (2015). Maternal emotion and cognitive control capacities and parenting: A conceptual framework. *Developmental Review*, 36, 105–126. <https://doi.org/10.1016/j.dr.2015.01.004>
- Cruise, K. E., & Becerra, R. (2018). Alexithymia and problematic alcohol use: A critical update. *Addictive Behaviors*, 77, 232–246. <https://doi.org/10.1016/j.addbeh.2017.09.025>
- Cuevas, K., Deater-Deckard, K., Kim-Spoon, J., Wang, Z., Morasch, K. C., & Bell, M. A. (2014). A longitudinal intergenerational analysis of executive functions during early childhood. *British Journal of Developmental Psychology*, 32(1), 50–64. <https://doi.org/10.1111/bjdp.12021>
- Cuijpers, P., Langendoen, Y., & Bijl, R. V. (1999). Psychiatric disorders in adult children of problem drinkers: prevalence, first onset and comparison with other risk factors. *Addiction*, 94(10), 1489–1498. <https://doi.org/10.1046/J.1360-0443.1999.941014895.X>
- Cummings, E. M., & Davies, P. T. (1994). Maternal Depression and Child Development. *Journal of Child Psychology and Psychiatry*, 35(1), 73–122. <https://doi.org/10.1111/J.1469-7610.1994.TB01133.X>

- Cummings, J. L. (1995). Anatomic and Behavioral Aspects of Frontal-Subcortical Circuits. *Annals of the New York Academy of Sciences*. <https://doi.org/10.1111/j.1749-6632.1995.tb38127.x>
- Currie, S. R., Patten, S. B., Williams, J. V., Wang, J., Beck, C. A., El-Guebaly, N., & Maxwell, C. (2005). Comorbidity of Major Depression with Substance Use Disorders: *The Canadian Journal of Psychiatry*, *50*(10), 660–666. <https://doi.org/10.1177/070674370505001013>
- Cuzzocrea, F., Barberis, N., Costa, S., & Larcán, R. (2015). Relationship between Alexithymia, Parenting Style, and Parental Control. *Psychological Reports*, *117*(2), 580–596. <https://doi.org/10.2466/21.10.PR0.117c22z7>
- D’Onofrio, B. M., Van Hulle, C. A., Waldman, I. D., Rodgers, J. L., Rathouz, P. J., & Lahey, B. B. (2007). Causal inferences regarding prenatal alcohol exposure and childhood externalizing problems. *Archives of General Psychiatry*. <https://doi.org/10.1001/archpsyc.64.11.1296>
- Dakof, G. A., Cohen, J. B., Henderson, C. E., Duarte, E., Boustani, M., Blackburn, A., Venzler, E., & Hawes, S. (2010). A randomized pilot study of the Engaging Moms Program for family drug court. *Journal of Substance Abuse Treatment*, *38*(3), 263–274. <https://doi.org/10.1016/j.jsat.2010.01.002>
- Darwiche, J., Fivaz-Depeursinge, E., & Corboz-Warnery, A. (2016). Prenatal Intuitive Coparenting Behaviors. *Frontiers in Psychology*, *0*(OCT), 1662. <https://doi.org/10.3389/FPSYG.2016.01662>
- Davies, J. K., & Bledsoe, J. M. (2005). Prenatal Alcohol and Drug Exposures in Adoption. *Pediatric Clinics of North America*, *52*(5), 1369–1393. <https://doi.org/10.1016/j.pcl.2005.06.015>
- Davis, L., Uezato, A., Newell, J. M., & Frazier, E. (2008). Major depression and comorbid substance use disorders. *Current Opinion in Psychiatry*, *21*(1), 14–18. <https://doi.org/10.1097/YCO.0B013E3282F32408>
- Dawson, G., Frey, K., Panagiotides, H., Yamada, E., Hessler, D., & Osterling, J. (1999). Infants of Depressed Mothers Exhibit Atypical Frontal Electrical Brain Activity during Interactions with Mother and with a Familiar, Nondepressed Adult. *Child Development*, *70*(5), 1058–1066. <https://doi.org/10.1111/1467-8624.00078>
- De Carli, P., Bakermans-Kranenburg, M. J., Parolin, L., Lega, C., Zanardo, B., Cattaneo, Z., & Riem, M. M. E. (2019). A walk on the dark side: TMS over the right inferior frontal gyrus (rIFG) disrupts behavioral responses to infant stimuli. *Social Neuroscience*. <https://doi.org/10.1080/17470919.2019.1574891>
- De Carli, P., Riem Madelon, M. E., & Parolin, L. (2017). Approach-avoidance responses to infant facial expressions in nulliparous women: Associations with early experience and mood induction. *Infant Behavior and Development*. <https://doi.org/10.1016/j.infbeh.2017.08.005>
- De Palo, F., Capra, N., Simonelli, A., Salcuni, S., & Di Riso, D. (2014). Parenting quality in drug-addicted mothers in a therapeutic mother-child community: the contribution of attachment and personality assessment. *Frontiers in Psychology*, *5*. <https://doi.org/10.3389/fpsyg.2014.01009>
- De Palo, F., Simonelli, A., Capra, N. (2016). L’esposizione prenatale alle droghe come forma di maltrattamento : un caso singolo dalla gravidanza ai 24 mesi di vita del bambino. *Maltrattamento e Abuso All’infanzia*, *18*(1), 119–144. <https://doi.org/10.3280/MAL2016-001006>
- De Rick, A., & Vanheule, S. (2006). The relationship between perceived parenting, adult attachment style and alexithymia in alcoholic inpatients. *Addictive Behaviors*, *31*(7), 1265–1270. <https://doi.org/10.1016/j.addbeh.2005.08.010>
- de Timary, P., Luts, A., Hers, D., & Luminet, O. (2008). Absolute and relative stability of alexithymia in alcoholic inpatients undergoing alcohol withdrawal: Relationship to depression and anxiety. *Psychiatry Research*, *157*(1–3), 105–113. <https://doi.org/10.1016/j.psychres.2006.12.008>
- De Wolff, M. S., & van Ijzendoorn, M. H. (1997). Sensitivity and Attachment: A Meta-Analysis on Parental Antecedents of Infant Attachment. *Child Development*. <https://doi.org/10.1111/j.1467-8624.1997.tb04218.x>

- Deater-Deckard, K., & Sturge-Apple, M. L. (2017). Introduction to the special section: Mind and matter: New insights on the role of parental cognitive and neurobiological functioning in process models of parenting. *Journal of Family Psychology, 31*(1), 5–7. <https://doi.org/10.1037/fam0000300>
- Deater-Deckard, Kirby, & Bell, M. A. (2017). Maternal executive function, heart rate, and EEG alpha reactivity interact in the prediction of harsh parenting. *Journal of Family Psychology, 31*(1), 41–50. <https://doi.org/10.1037/fam0000286>
- Deater-Deckard, Kirby, Chen, N., Wang, Z., & Bell, M. A. (2012). Socioeconomic risk moderates the link between household chaos and maternal executive function. *Journal of Family Psychology.* <https://doi.org/10.1037/a0028331>
- Deater-Deckard, Kirby, Sewell, M. D., Petrill, S. A., & Thompson, L. A. (2010). Maternal working memory and reactive negativity in parenting. *Psychological Science, 21*(1), 75–79. <https://doi.org/10.1177/0956797609354073>
- Deater-Deckard, Kirby, Wang, Z., Chen, N., & Bell, M. A. (2012). Maternal executive function, harsh parenting, and child conduct problems. *Journal of Child Psychology and Psychiatry and Allied Disciplines.* <https://doi.org/10.1111/j.1469-7610.2012.02582.x>
- DeMulder, E. K., Tarullo, L. B., Klimes-Dougan, B., Free, K., & Radke-Yarrow, M. (1995). Personality Disorders of Affectively Ill Mothers: Links to Maternal Behavior. *Journal of Personality Disorders, 9*(3), 199–212. <https://doi.org/10.1521/PEDI.1995.9.3.199>
- Deno, M., Miyashita, M., Fujisawa, D., Nakajima, S., & Ito, M. (2011). The relationships between complicated grief, depression, and alexithymia according to the seriousness of complicated grief in the Japanese general population. *Journal of Affective Disorders.* <https://doi.org/10.1016/j.jad.2011.06.037>
- Derogatis, L. (1975). *SCL-90-R: Symptom Checklist-90-R: Administration, scoring, and procedures manual.* NCS Pearson.
- Derogatis, L. R. (1994). *Symptom Checklist-90-R: Administration, Scoring & Procedure Manual for the Revised Version of the SCL-90.* National Computer Systems.
- Diamond, A. (2013). Executive Functions. *Annual Review of Psychology.* <https://doi.org/10.1146/annurev-psych-113011-143750>
- Dix, T. (2000). Understanding What Motivates Sensitive Parenting. *Psychological Inquiry, 11*(2), 94–97.
- Dixon, L. J., Lee, A. A., Gratz, K. L., & Tull, M. T. (2018). Anxiety sensitivity and sleep disturbance: Investigating associations among patients with co-occurring anxiety and substance use disorders. *Journal of Anxiety Disorders, 53*, 9–15. <https://doi.org/10.1016/j.janxdis.2017.10.009>
- Dolman, C., Jones, I., & Howard, L. M. (2013). Pre-conception to parenting: A systematic review and meta-synthesis of the qualitative literature on motherhood for women with severe mental illness. *Archives of Women's Mental Health, 16*(3), 173–196. <https://doi.org/10.1007/S00737-013-0336-0/TABLES/5>
- Domenici, C., Cuttano, A., Nardini, V., Varese, L., Ghirri, P., & Boldrini, A. (2009). Drug addiction during pregnancy: Correlations between the placental health and the newborn's outcome – Elaboration of a predictive score. *Gynecological Endocrinology, 25*(12), 786–792. <https://doi.org/10.3109/09513590902898221>
- Downey, G., & Coyne, J. C. (1990). Children of depressed parents: An integrative review. *Psychological Bulletin, 108*(1), 50–76. <https://psycnet.apa.org/buy/1990-28362-001>
- Drago, R. (2009). The Parenting of Infants: A Time-Use Study. *Monthly Labor Review, 132.* <https://heinonline.org/HOL/Page?handle=hein.journals/month132&id=1194&div=&collection=>
- Draper, N. R., & Cox, D. R. (1969). On Distributions and Their Transformation to Normality. *Journal of the Royal Statistical Society: Series B (Methodological), 31*(3), 472–476. <https://doi.org/10.1111/j.2517-6161.1969.tb00806.x>

- Dunn, M. G., Tarter, R. E., Mezzich, A. C., Vanyukov, M., Kirisci, L., & Kirillova, G. (2002). Origins and consequences of child neglect in substance abuse families. *Clinical Psychology Review*, 22(7), 1063–1090. [https://doi.org/10.1016/S0272-7358\(02\)00132-0](https://doi.org/10.1016/S0272-7358(02)00132-0)
- Dwairy, M. A. (2007). Parental Inconsistency Versus Parental Authoritarianism: Associations with Symptoms of Psychological Disorders. *Journal of Youth and Adolescence* 2007 37:5, 37(5), 616–626. <https://doi.org/10.1007/S10964-007-9169-3>
- Easterbrooks, M. A., Bureau, J. F., & Lyons-Ruth, K. (2012). Developmental correlates and predictors of emotional availability in mother-child interaction: A longitudinal study from infancy to middle childhood. *Development and Psychopathology*. <https://doi.org/10.1017/S0954579411000666>
- Easterbrooks, M. A., Chaudhuri, J. H., & Gestsdottir, S. (2005). Patterns of emotional availability among young mothers and their infants: A dyadic, contextual analysis. *Infant Mental Health Journal*, 26(4), 309–326. <https://doi.org/10.1002/IMHJ.20057>
- Efird, J. (2011). Blocked randomization with randomly selected block sizes. *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph8010015>
- Eiden, R. Das. (2001). Maternal substance use and mother-infant feeding interactions. *Infant Mental Health Journal*, 22(4), 497–511. <https://doi.org/10.1002/imhj.1013>
- Eiden, R. D., Schuetze, P., & Coles, C. D. (2011). Maternal cocaine use and mother–infant interactions: Direct and moderated associations. *Neurotoxicology and Teratology*, 33(1), 120–128. <https://doi.org/10.1016/J.NTT.2010.08.005>
- Elmqvist, J., Shorey, R. C., Anderson, S. E., & Stuart, G. L. (2016). The Relationship Between Generalized Anxiety Symptoms and Treatment Dropout Among Women in Residential Treatment for Substance Use Disorders. *Substance Use & Misuse*, 51(7), 835–839. <https://doi.org/10.3109/10826084.2016.1155612>
- Engle, P. L. (2009). Maternal mental health: program and policy implications. *The American Journal of Clinical Nutrition*, 89(3), 963S-966S. <https://doi.org/10.3945/AJCN.2008.26692G>
- Erin C. Tully, P. D., William G. Iacono, P. D., & Matt McGue, P. D. (2008). An Adoption Study of Parental Depression as an Environmental Liability for Adolescent Depression and Childhood Disruptive Disorders. <https://doi.org/10.1176/Appi.Ajp.2008.07091438>, 165(9), 1148–1154. <https://doi.org/10.1176/APPLAJP.2008.07091438>
- Ersche, K. D., Turton, A. J., Chamberlain, S. R., Müller, U., Bullmore, E. T., & Robbins, T. W. (2012). Cognitive dysfunction and anxious-impulsive personality traits are endophenotypes for drug dependence. *American Journal of Psychiatry*. <https://doi.org/10.1176/appi.ajp.2012.11091421>
- Espinete, S. D., Motz, M., Jeong, J. J., Jenkins, J. M., & Pepler, D. (2016). ‘Breaking the Cycle’ of maternal substance use through relationships: a comparison of integrated approaches. *Addiction Research and Theory*, 24(5), 375–388. <https://doi.org/10.3109/16066359.2016.1140148>
- Espy, K. A. (2004). Using developmental, cognitive, and neuroscience approaches to understand executive control in young children. In *Developmental Neuropsychology*. https://doi.org/10.1207/s15326942dn2601_1
- Euser, S., Vrijhof, C. I., Van den Bulk, B. G., Vermeulen, R., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2021). Video-feedback promotes sensitive limit-setting in parents of twin preschoolers: a randomized controlled trial. *BMC Psychology*, 9(1), 1–14. <https://doi.org/10.1186/s40359-021-00548-z>
- Eyler, F. D., & Behnke, M. (1999). Early Development of Infants Exposed to Drugs Prenatally. *Clinics in Perinatology*, 26(1), 107–150. [https://doi.org/10.1016/S0095-5108\(18\)30075-7](https://doi.org/10.1016/S0095-5108(18)30075-7)
- Falkenstein, M., Hoormann, J., & Hohnsbein, J. (1999). ERP components in Go/Nogo tasks and their relation to inhibition. *Acta Psychologica*, 101(2–3), 267–291. <https://doi.org/10.1016/S0001->

- Farges, F., Corcos, M., Speranza, M., Loas, G., Perez-Diaz, F., Venisse, J.-L., Lang, F., Bizouard, P., Halfon, O., Flament, M., & Jeammet, P. (2004). Alexithymie et toxicomanie : lien avec la dépression. *L'Encéphale*, *30*(3), 201–211. [https://doi.org/10.1016/S0013-7006\(04\)95431-0](https://doi.org/10.1016/S0013-7006(04)95431-0)
- Farrington, D. P., & Loeber, R. (2000). Some benefits of dichotomization in psychiatric and criminological research. *Criminal Behaviour and Mental Health*. <https://doi.org/10.1002/cbm.349>
- Fay-Stammbach, T., Hawes, D. J., & Meredith, P. (2014). Parenting Influences on Executive Function in Early Childhood: A Review. *Child Development Perspectives*, *8*(4), 258–264. <https://doi.org/10.1111/cdep.12095>
- Fearon, R. P., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Lapsley, A.-M., & Roisman, G. I. (2010). The Significance of Insecure Attachment and Disorganization in the Development of Children's Externalizing Behavior: A Meta-Analytic Study. *Child Development*, *81*(2), 435–456. <https://doi.org/10.1111/J.1467-8624.2009.01405.X>
- Fehrman, E., Egan, V., Gorban, A. N., Levesley, J., Mirkes, E. M., & Muhammad, A. K. (2019). Drug Use and Personality Profiles. *Personality Traits and Drug Consumption*, 5–33. https://doi.org/10.1007/978-3-030-10442-9_2
- Feil, J., Sheppard, D., Fitzgerald, P. B., Yücel, M., Lubman, D. I., & Bradshaw, J. L. (2010). Addiction, compulsive drug seeking, and the role of frontostriatal mechanisms in regulating inhibitory control. In *Neuroscience and Biobehavioral Reviews*. <https://doi.org/10.1016/j.neubiorev.2010.03.001>
- Feldman, R. (2012). Bio-behavioral Synchrony: A Model for Integrating Biological and Microsocial Behavioral Processes in the Study of Parenting. *Parenting*, *12*(2–3), 154–164. <https://doi.org/10.1080/15295192.2012.683342>
- Feldman, R. (2016). Parent–Infant Synchrony: Biological Foundations and Developmental Outcomes. <https://doi.org/10.1111/j.1467-8721.2007.00532.X>, *16*(6), 340–345. <https://doi.org/10.1111/J.1467-8721.2007.00532.X>
- Feldman, R., & Eidelman, A. I. (2007). Maternal postpartum behavior and the emergence of infant–mother and infant–father synchrony in preterm and full-term infants: The role of neonatal vagal tone. *Developmental Psychobiology*, *49*(3), 290–302. <https://doi.org/10.1002/DEV.20220>
- Feldman, R., Eidelman, A. I., Sirota, L., & Weller, A. (2002). Comparison of Skin-to-Skin (Kangaroo) and Traditional Care: Parenting Outcomes and Preterm Infant Development. *Pediatrics*, *110*(1), 16–26. <https://doi.org/10.1542/PEDS.110.1.16>
- Feldman, R., Gordon, I., & Zagoory-Sharon, O. (2010). The cross-generation transmission of oxytocin in humans. *Hormones and Behavior*, *58*(4), 669–676. <https://doi.org/10.1016/J.YHBEH.2010.06.005>
- Fernandez-Montalvo, J., & López-Goñi, J. J. (2010). Comparison of completers and dropouts in psychological treatment for cocaine addiction. *Addiction Research & Theory*, *18*(4), 433–441. <https://doi.org/10.3109/16066350903324826>
- Fernandez, E., & Lee, J.-S. (2013). Accomplishing family reunification for children in care: An Australian study. *Children and Youth Services Review*, *35*(9), 1374–1384. <https://doi.org/10.1016/j.childyouth.2013.05.006>
- Field, M., & Cox, W. M. (2008). Attentional bias in addictive behaviors: A review of its development, causes, and consequences. In *Drug and Alcohol Dependence*. <https://doi.org/10.1016/j.drugalcdep.2008.03.030>
- Field, T., Diego, M., & Hernandez-Reif, M. (2006). Prenatal depression effects on the fetus and newborn: a review. *Infant Behavior and Development*, *29*(3), 445–455. <https://doi.org/10.1016/J.INFBEH.2006.03.003>

- Field, T., Healy, B., Goldstein, S., Perry, S., Bendell, D., Schanberg, S., Zimmerman, E. A., & Kuhn, C. (1988). Infants of Depressed Mothers Show “Depressed” Behavior Even with Nondepressed Adults. *Child Development*, 59(6), 1569. <https://doi.org/10.2307/1130671>
- Fimbel, E., Lauzon, S., & Rainville, C. (2009). Performance of humans vs. exploration algorithms on the Tower of London Test. *PLoS ONE*. <https://doi.org/10.1371/journal.pone.0007263>
- Fitzgerald, E., Kaltenbach, K., & Finnegan, L. (1990). Patterns of interaction among drug dependent women and their infants. *Pediatr. Res*, 10(24).
- Flouri, E. (2008). Contextual risk and child psychopathology. *Child Abuse and Neglect*. <https://doi.org/10.1016/j.chiabu.2007.12.008>
- Flykt, M., Punamäki, R.-L., Belt, R., Biringen, Z., Salo, S., Posa, T., & Pajulo, M. (2012). Maternal representations and emotional availability among drug-abusing and nonusing mothers and their infants. *Infant Mental Health Journal*, 33(2), 123–138. <https://doi.org/10.1002/imhj.21313>
- Fonagy, P., Gergely, G., Jurist, E. L., & Target, M. (2018). Affect regulation, mentalization and the development of the self. In *Affect Regulation, Mentalization and the Development of the Self*. <https://doi.org/10.4324/9780429471643>
- Fonagy, P., Steele, M., Steele, H., Moran, G. S., & Higgitt, A. C. (1991a). The capacity for understanding mental states: The reflective self in parent and child and its significance for security of attachment. *Infant Mental Health Journal*, 12(3), 201–218. [https://doi.org/10.1002/1097-0355\(199123\)12:3<201::AID-IMHJ2280120307>3.0.CO;2-7](https://doi.org/10.1002/1097-0355(199123)12:3<201::AID-IMHJ2280120307>3.0.CO;2-7)
- Fonagy, P., Steele, M., Steele, H., Moran, G. S., & Higgitt, A. C. (1991b). The capacity for understanding mental states: The reflective self in parent and child and its significance for security of attachment. *Infant Mental Health Journal*. [https://doi.org/10.1002/1097-0355\(199123\)12:3<201::AID-IMHJ2280120307>3.0.CO;2-7](https://doi.org/10.1002/1097-0355(199123)12:3<201::AID-IMHJ2280120307>3.0.CO;2-7)
- Fonagy, P., & Target, M. (1997). Attachment and reflective function: Their role in self-organization. *Development and Psychopathology*. <https://doi.org/10.1017/s0954579497001399>
- Forbes, E. E., Cohn, J. F., Allen, N. B., & Lewinsohn, P. M. (2004). Infant affect during parent-infant interaction at 3 and 6 months: Differences between mothers and fathers and influence of parent history of depression. *Infancy*, 5(1), 61–84. https://doi.org/10.1207/S15327078IN0501_3
- Forehand, R., Lautenschlager, G. J., Faust, J., & Graziano, W. G. (1986). Parent perceptions and parent-child interactions in clinic-referred children: a preliminary investigation of the effects of maternal depressive moods. *Behaviour Research and Therapy*, 24(1), 73–75. [https://doi.org/10.1016/0005-7967\(86\)90152-X](https://doi.org/10.1016/0005-7967(86)90152-X)
- Forray, A. (2016). Substance use during pregnancy. *F1000Research*, 5. <https://doi.org/10.12688/F1000RESEARCH.7645.1>
- Fowles, D. C. (1992). Schizophrenia: Diathesis-Stress Revisited. *Annual Review of Psychology*, 43(1), 303–336. <https://doi.org/10.1146/ANNUREV.PS.43.020192.001511>
- Fox, C. J., Mueller, S. T., Gray, H. M., Raber, J., & Piper, B. J. (2013). Evaluation of a Short-Form of the Berg Card Sorting Test. *PLoS ONE*. <https://doi.org/10.1371/journal.pone.0063885>
- França, U. L., Mustafa, S., & McManus, M. L. (2015). The Growing Burden of Neonatal Opiate Exposure on Children and Family Services in Massachusetts: *Child Maltreatment*, 21(1), 80–84. <https://doi.org/10.1177/1077559515615437>
- Franz, M., Popp, K., Schaefer, R., Sitte, W., Schneider, C., Hardt, J., Decker, O., & Braehler, E. (2008). Alexithymia in the German general population. *Social Psychiatry and Psychiatric Epidemiology*, 43(1), 54–62. <https://doi.org/10.1007/s00127-007-0265-1>
- Fraser, J. G., Harris-Britt, A., Thakkallapalli, E. L., Kurtz-Costes, B., & Martin, S. (2010). Emotional

availability and psychosocial correlates among mothers in substance-abuse treatment and their young infants. *Infant Mental Health Journal*. <https://doi.org/10.1002/imhj.20239>

- Fried, P. A., James, D. S., & Watkinson, B. (2001). Growth and pubertal milestones during adolescence in offspring prenatally exposed to cigarettes and marijuana. *Neurotoxicology and Teratology*, *23*(5), 431–436. [https://doi.org/10.1016/S0892-0362\(01\)00161-1](https://doi.org/10.1016/S0892-0362(01)00161-1)
- Friedman, N. P., & Miyake, A. (2004). The Relations Among Inhibition and Interference Control Functions: A Latent-Variable Analysis. *Journal of Experimental Psychology: General*, *133*(1), 101–135. <https://doi.org/10.1037/0096-3445.133.1.101>
- Frigerio, A., Porreca, A., Simonelli, A., & Nazzari, S. (2019). Emotional availability in samples of mothers at high risk for depression and with substance use disorder. *Frontiers in Psychology*, *10*. <https://doi.org/10.3389/fpsyg.2019.00577>
- Frigerio, Alessandra, Porreca, A., Simonelli, A., & Nazzari, S. (2019). Emotional Availability in Samples of Mothers at High Risk for Depression and With Substance Use Disorder. *Frontiers in Psychology*, *10*. <https://doi.org/10.3389/fpsyg.2019.00577>
- Ghalehban, M., & Besharat, M. A. (2011). Examination and Comparison of Alexithymia and Self-Regulation in Patients with Substance Abuse Disorder and Normal Individuals. *Procedia - Social and Behavioral Sciences*, *30*, 38–42. <https://doi.org/10.1016/j.sbspro.2011.10.008>
- Glasheen, C., Richardson, G. A., & Fabio, A. (2009). A systematic review of the effects of postnatal maternal anxiety on children. *Archives of Women's Mental Health* *2009 13:1*, *13*(1), 61–74. <https://doi.org/10.1007/S00737-009-0109-Y>
- Glocker, M. L., Langleben, D. D., Ruparel, K., Loughead, J. W., Valdez, J. N., Griffin, M. D., Sachser, N., & Gur, R. C. (2009). Baby schema modulates the brain reward system in nulliparous women. *Proceedings of the National Academy of Sciences*, *106*(22), 9115–9119. <https://doi.org/10.1073/pnas.0811620106>
- Glover, V. (2011). Annual Research Review: Prenatal stress and the origins of psychopathology: an evolutionary perspective. *Journal of Child Psychology and Psychiatry*, *52*(4), 356–367. <https://doi.org/10.1111/J.1469-7610.2011.02371.X>
- Glover, V., & Capron, L. (2017). Prenatal parenting. *Current Opinion in Psychology*, *15*, 66–70. <https://doi.org/10.1016/J.COPSYC.2017.02.007>
- Goldberg, S. (1977). Social competence in infancy: a model of parent-infant interaction. *Merrill-Palmer Quarterly of Behavior and Development*, *23*(3), 163–177. <https://about.jstor.org/terms>
- Goldman, R. S., & Goldman, M. S. (1988). Experience-dependent cognitive recovery in alcoholics: A task component strategy. *Journal of Studies on Alcohol*. <https://doi.org/10.15288/jsa.1988.49.142>
- Goldschmidt, L., Richardson, G. A., Cornelius, M. D., & Day, N. L. (2004). Prenatal marijuana and alcohol exposure and academic achievement at age 10. *Neurotoxicology and Teratology*, *26*(4), 521–532. <https://doi.org/10.1016/j.ntt.2004.04.003>
- Goldstein, R. Z., & Volkow, N. D. (2002). Drug addiction and its underlying neurobiological basis: Neuroimaging evidence for the involvement of the frontal cortex. In *American Journal of Psychiatry*. <https://doi.org/10.1176/appi.ajp.159.10.1642>
- Gonzalez, A., Jenkins, J. M., Steiner, M., & Fleming, A. S. (2012). Maternal Early Life Experiences and Parenting: The Mediating Role of Cortisol and Executive Function. *Journal of the American Academy of Child & Adolescent Psychiatry*, *51*(7), 673–682. <https://doi.org/10.1016/j.jaac.2012.04.003>
- Goodman, S. H., & Brumley, H. E. (1990). Schizophrenic and Depressed Mothers: Relational Deficits in Parenting. *Developmental Psychology*, *26*(1), 31–39. <https://doi.org/10.1037/0012-1649.26.1.31>
- Goodman, S. H., & Gotlib, I. H. (1999). Risk for psychopathology in the children of depressed mothers: A developmental model for understanding mechanisms of transmission. *Psychological Review*, *106*(3),

458–490. <https://doi.org/10.1037/0033-295X.106.3.458>

- Goodman, S. H., Rouse, M. H., Connell, A. M., Broth, M. R., Hall, C. M., & Heyward, D. (2011). Maternal Depression and Child Psychopathology: A Meta-Analytic Review. *Clinical Child and Family Psychology Review* 2011 14:1, 14(1), 1–27. <https://doi.org/10.1007/S10567-010-0080-1>
- Gordon, I., Pratt, M., Bergunde, K., Zagoory-Sharon, O., & Feldman, R. (2017). Testosterone, oxytocin, and the development of human parental care. *Hormones and Behavior*, 93, 184–192. <https://doi.org/10.1016/J.YHBEH.2017.05.016>
- Gray, T. R., LaGasse, L. L., Smith, L. M., Derauf, C., Grant, P., Shah, R., Arria, A. M., Grotta, S. A. Della, Strauss, A., Haning, W. F., Lester, B. M., & Huestis, M. A. (2009). Identification of Prenatal Amphetamines Exposure by Maternal Interview and Meconium Toxicology in the Infant Development, Environment and Lifestyle (IDEAL) Study. *Therapeutic Drug Monitoring*, 31(6), 769. <https://doi.org/10.1097/FTD.0B013E3181BB438E>
- Green, J. A., Gustafson, G. E., & West, M. J. (1980). Effects of Infant Development on Mother-Infant Interactions. *Child Development*, 51(1), 199. <https://doi.org/10.2307/1129607>
- Greenson, R. R. (2018). The Technique and Practice of Psychoanalysis : Volume I. In *The Technique and Practice of Psychoanalysis* (Vol. 1). Routledge. <https://doi.org/10.4324/9780429483417>
- Grienenberger, J., Kelly, K., & Slade, A. (2005). Maternal reflective functioning, mother-infant affective communication, and infant attachment: Exploring the link between mental states and observed caregiving behavior in the intergenerational transmission of attachment. *Attachment and Human Development*. <https://doi.org/10.1080/14616730500245963>
- Griffith, D. R., Azuma, S. D., & Chasnoff, I. J. (1994). Three-Year Outcome of Children Exposed Prenatally to Drugs. *Journal of the American Academy of Child & Adolescent Psychiatry*, 33(1), 20–27. <https://doi.org/10.1097/00004583-199401000-00004>
- Groeneveld, M. G., Vermeer, H. J., van IJzendoorn, M. H., & Linting, M. (2011). Enhancing Home-Based Child Care Quality Through Video-Feedback Intervention: A Randomized Controlled Trial. *Journal of Family Psychology*, 25(1), 86–96. <https://doi.org/10.1037/a0022451>
- Groh, A. M., Fearon, R. P., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Steele, R. D., & Roisman, G. I. (2014). The significance of attachment security for children’s social competence with peers: A meta-analytic study. *Attachment and Human Development*. <https://doi.org/10.1080/14616734.2014.883636>
- Groome, L. J., Mooney, D. M., Holland, S. B., Smith, L. A., Atterbury, J. L., & Dykman, R. A. (1999). Behavioral state affects heart rate response to low-intensity sound in human fetuses. *Early Human Development*, 54(1), 39–54. [https://doi.org/10.1016/S0378-3782\(98\)00083-8](https://doi.org/10.1016/S0378-3782(98)00083-8)
- Güney, E., & Uçar, T. (2019). Effect of the fetal movement count on maternal–fetal attachment. *Japan Journal of Nursing Science*, 16(1), 71–79. <https://doi.org/10.1111/JJNS.12214>
- Hagan, J. F., Balachova, T., Bertrand, J., Chasnoff, I., Dang, E., Fernandez-Baca, D., Kable, J., Kosofsky, B., Senturias, Y. N., Singh, N., Sloane, M., Weitzman, C., & Zubler, J. (2016). Neurobehavioral Disorder Associated With Prenatal Alcohol Exposure. *Pediatrics*, 138(4), e20151553–e20151553. <https://doi.org/10.1542/peds.2015-1553>
- Hager, D. L. (1992). Chaos and growth. *Psychotherapy*, 29(3), 378–384. <https://doi.org/10.1037/H0088539>
- Håkansson, U., Halså, A., Söderström, K., Skårderud, F., & Øie, M. G. (2015). Keeping mind in mind: Mentalizing and executive functioning in substance-abusing infant mothers: Effect on dyadic relationship and infant outcome. *Substance Abuse: Research and Treatment*. <https://doi.org/10.4137/SART.S23502>
- Håkansson, U., Söderström, K., Watten, R., Skårderud, F., & Øie, M. G. (2018a). Parental reflective functioning and executive functioning in mothers with substance use disorder. *Attachment and Human*

Development. <https://doi.org/10.1080/14616734.2017.1398764>

- Håkansson, U., Söderström, K., Watten, R., Skårderud, F., & Øie, M. G. (2018b). Parental reflective functioning and executive functioning in mothers with substance use disorder. *Attachment & Human Development, 20*(2), 181–207. <https://doi.org/10.1080/14616734.2017.1398764>
- Hall, K. S., Moreau, C., & Trussell, J. (2013). The Link Between Substance Use and Reproductive Health Service Utilization Among Young US Women. *Substance Abuse, 34*(3), 283–291. <https://doi.org/10.1080/08897077.2013.772934>
- Haller, D. L., & Miles, D. R. (2008). Psychopathology Is Associated with Completion of Residential Treatment in Drug Dependent Women. *Journal of Addictive Diseases, 23*(1), 17–28. https://doi.org/10.1300/J069V23N01_02
- Haller, D. L., Miles, D. R., & Dawson, K. S. (2002). Psychopathology influences treatment retention among drug-dependent women. *Journal of Substance Abuse Treatment, 23*(4), 431–436. [https://doi.org/10.1016/S0740-5472\(02\)00283-0](https://doi.org/10.1016/S0740-5472(02)00283-0)
- Handelsman, L., Stein, J. A., Bernstein, D. P., Oppenheim, S. E., Rosenblum, A., & Magura, S. (2000). A latent variable analysis of coexisting emotional deficits in substance abusers. *Addictive Behaviors, 25*(3), 423–428. [https://doi.org/10.1016/S0306-4603\(99\)00010-6](https://doi.org/10.1016/S0306-4603(99)00010-6)
- Hans, S. L. (1999). Demographic and Psychosocial Characteristics of Substance-Abusing Pregnant Women. *Clinics in Perinatology, 26*(1), 55–74. [https://doi.org/10.1016/S0095-5108\(18\)30072-1](https://doi.org/10.1016/S0095-5108(18)30072-1)
- Hans, S. L. (2002). Studies of prenatal exposure to drugs: Focusing on parental care of children. *Neurotoxicology and Teratology, 24*(3), 329–337. [https://doi.org/10.1016/S0892-0362\(02\)00195-2](https://doi.org/10.1016/S0892-0362(02)00195-2)
- Hans, S. L., & Jeremy, R. J. (2001). Postneonatal mental and motor development of infants exposed in utero to opioid drugs. *Infant Mental Health Journal, 22*(3), 300–315. <https://doi.org/10.1002/imhj.1003>
- Harold, G. T., Rice, F., Hay, D. F., Boivin, J., Bree, M. van den, & Thapar, A. (2011). Familial transmission of depression and antisocial behavior symptoms: disentangling the contribution of inherited and environmental factors and testing the mediating role of parenting. *Psychological Medicine, 41*(6), 1175–1185. <https://doi.org/10.1017/S0033291710001753>
- Hasin, D. S., O'Brien, C. P., Auriacombe, M., Borges, G., Bucholz, K., Budney, A., Compton, W. M., Crowley, T., Ling, W., Petry, N. M., Schuckit, M., & Grant, B. F. (2013). DSM-5 Criteria for Substance Use Disorders: Recommendations and Rationale. *The American Journal of Psychiatry, 170*(8), 834–851. <https://doi.org/10.1176/APPI.AJP.2013.12060782>
- Haviland, M. G., Hendryx, M. S., Shaw, D. G., & Henry, J. P. (1994). Alexithymia in women and men hospitalized for psychoactive substance dependence. *Comprehensive Psychiatry, 35*(2), 124–128. [https://doi.org/10.1016/0010-440X\(94\)90056-N](https://doi.org/10.1016/0010-440X(94)90056-N)
- Haviland, M. G., Shaw, D. G., MacMurray, J. P., & Cummings, M. A. (1988). Validation of the Toronto Alexithymia Scale with Substance Abusers. *Psychotherapy and Psychosomatics, 50*(2), 81–87. <https://doi.org/10.1159/000288104>
- Hayes, A. M., Feldman, G. C., Beevers, C. G., Laurenceau, J. P., Cardaciotto, L. A., & Lewis-Smith, J. (2007). Discontinuities and Cognitive Changes in an Exposure-Based Cognitive Therapy for Depression. *Journal of Consulting and Clinical Psychology, 75*(3), 409–421. <https://doi.org/10.1037/0022-006X.75.3.409>
- Hayes, A. M., Laurenceau, J. P., Feldman, G., Strauss, J. L., & Cardaciotto, L. A. (2007). Change is not always linear: The study of nonlinear and discontinuous patterns of change in psychotherapy. *Clinical Psychology Review, 27*(6), 715–723. <https://doi.org/10.1016/J.CPR.2007.01.008>
- Hayes, A. M., & Strauss, J. L. (1998). Dynamic systems theory as a paradigm for the study of change in psychotherapy: An application to cognitive therapy for depression. *Journal of Consulting and Clinical Psychology, 66*(6), 939–947. <https://doi.org/10.1037/0022-006X.66.6.939>

- Herbeck, D. M., Fitek, D. J., Svikis, D. S., Montoya, I. D., Marcus, S. C., & West, J. C. (2005). Treatment Compliance in Patients with Comorbid Psychiatric and Substance Use Disorders. *The American Journal on Addictions, 14*(3), 195–207. <https://doi.org/10.1080/10550490590949488>
- Heron, J., O'Connor, T. G., Evans, J., Golding, J., & Glover, V. (2004). The course of anxiety and depression through pregnancy and the postpartum in a community sample. *Journal of Affective Disorders, 80*(1), 65–73. <https://doi.org/10.1016/J.JAD.2003.08.004>
- Hersov, L. A. (1960). PERSISTENT NON-ATTENDANCE AT SCHOOL*. *Journal of Child Psychology and Psychiatry, 1*(2), 130–136. <https://doi.org/10.1111/J.1469-7610.1960.TB01987.X>
- Hill, C. R., & Stafford, F. P. (1980). Parental Care of Children: Time Diary Estimates of Quantity, Predictability, and Variety. *The Journal of Human Resources, 15*(2), 219. <https://doi.org/10.2307/145332>
- Hintikka, J., Honkalampi, K., Lehtonen, J., & Viinamäki, H. (2001). Are alexithymia and depression distinct or overlapping constructs?: A study in a general population. *Comprehensive Psychiatry, 42*(3), 234–239. <https://doi.org/10.1053/comp.2001.23147>
- Hoff, E. (2003). The Specificity of Environmental Influence: Socioeconomic Status Affects Early Vocabulary Development Via Maternal Speech. *Child Development, 74*(5), 1368–1378. <https://doi.org/10.1111/1467-8624.00612>
- Hofmann, W., Schmeichel, B. J., & Baddeley, A. D. (2012). Executive functions and self-regulation. *Trends in Cognitive Sciences, 16*(3), 174–180. <https://doi.org/10.1016/J.TICS.2012.01.006>
- Hong, R. Y., & Tan, Y. L. (2021). DSM-5 personality traits and cognitive risks for depression, anxiety, and obsessive-compulsive symptoms. *Personality and Individual Differences, 169*, 110041. <https://doi.org/10.1016/J.PAID.2020.110041>
- Honkalampi, K., Hintikka, J., Tanskanen, A., Lehtonen, J., & Viinamäki, H. (2000). Depression is strongly associated with alexithymia in the general population. *Journal of Psychosomatic Research, 48*(1), 99–104. [https://doi.org/10.1016/S0022-3999\(99\)00083-5](https://doi.org/10.1016/S0022-3999(99)00083-5)
- Honkalampi, K., Koivumaa-Honkanen, H., Lehto, S. M., Hintikka, J., Haatainen, K., Rissanen, T., & Viinamäki, H. (2010). Is alexithymia a risk factor for major depression, personality disorder, or alcohol use disorders? A prospective population-based study. *Journal of Psychosomatic Research. https://doi.org/10.1016/j.jpsychores.2009.05.010*
- Howell, E. M., Heiser, N., & Harrington, M. (1999). A Review of Recent Findings on Substance Abuse Treatment for Pregnant Women. *Journal of Substance Abuse Treatment, 16*(3), 195–219. [https://doi.org/10.1016/S0740-5472\(98\)00032-4](https://doi.org/10.1016/S0740-5472(98)00032-4)
- Huebner, C. E. (2002). Evaluation of a Clinic-Based Parent Education Program to Reduce the Risk of Infant and Toddler Maltreatment. *Public Health Nursing, 19*(5), 377–389. <https://doi.org/10.1046/J.1525-1446.2002.19507.X>
- Hulse, G. K., Milne, E., English, D. R., & Holman, C. D. J. (1997). The relationship between maternal use of heroin and methadone and infant birth weight. *Addiction, 92*(11), 1571–1579. <https://doi.org/10.1111/j.1360-0443.1997.tb02877.x>
- Ingersoll, K. S., Knisely, J. S., Dawson, K. S., & Schnoll, S. H. (2004). Psychopathology and treatment outcome of drug dependent women in a perinatal program. *Addictive Behaviors, 29*(4), 731–741. <https://doi.org/10.1016/J.ADDBEH.2004.02.002>
- Isosävi, S., Flykt, M., Belt, R., Posa, T., Kuittinen, S., Puura, K., & Punamäki, R. L. (2016). Attachment representations among substance-abusing women in transition to motherhood: implications for prenatal emotions and mother–infant interaction. *Attachment and Human Development. https://doi.org/10.1080/14616734.2016.1151904*
- Jaffe, J., Beebe, B., Feldstein, S., Crown, C. L., Jasnow, M. D., Rochat, P., & Stern, D. (2001). Rhythms of

Dialogue in Infancy: Coordinated Timing in Development . *Monographs of the Society for Research in Child Development*, 66(2).

https://www.jstor.org/stable/3181589?casa_token=E5kWEumR6WkAAAAA%3AJ6G9D4Zdq0MXCJCAI5ojj4XURl4rcDZwDqCb_ajjmA7wvkJZUGgLPDZH-9_dk9SFc2AyKbtBqQXlrakOurhbO-9F_EBkn3c1FiUs1-gUBO7_gm9feqm7fQ&seq=1#metadata_info_tab_contents

Jeličić, H., Phelps, E., & Lerner, R. M. (2009). Use of Missing Data Methods in Longitudinal Studies: The Persistence of Bad Practices in Developmental Psychology. *Developmental Psychology*. <https://doi.org/10.1037/a0015665>

Jentsch, J. D., & Taylor, J. R. (1999). Impulsivity resulting from frontostriatal dysfunction in drug abuse: Implications for the control of behavior by reward-related stimuli. In *Psychopharmacology*. <https://doi.org/10.1007/PL00005483>

Johnson, A. L., Morrow, C. E., Accornero, V. H., Xue, L., Anthony, J. C., & Bandstra, E. S. (2002a). Maternal cocaine use: Estimated effects on mother-child play interactions in the preschool period. *Journal of Developmental and Behavioral Pediatrics*. <https://doi.org/10.1097/00004703-200208000-00001>

Johnson, A. L., Morrow, C. E., Accornero, V. H., Xue, L., Anthony, J. C., & Bandstra, E. S. (2002b). Maternal Cocaine Use: Estimated Effects on Mother-Child Play Interactions in the Preschool Period. *Journal of Developmental & Behavioral Pediatrics*, 23(4), 191–202. <https://doi.org/10.1097/00004703-200208000-00001>

Johnson, H. L., Glassman, M. B., Fiks, K. B., & Rosen, T. S. (1990). Resilient Children: Individual Differences in Developmental Outcome of Children Born to Drug Abusers. *The Journal of Genetic Psychology*, 151(4), 523–539. <https://doi.org/10.1080/00221325.1990.9914637>

Johnson, H. L., & Rosen, T. S. (1990). Mother-infant interaction in a multirisk population. *American Journal of Orthopsychiatry*, 60(2), 281–288. <https://doi.org/10.1037/h0079181>

Johnson, J. G., Cohen, P., Dohrenwend, B. P., Link, B. G., & Brook, J. S. (1999). A longitudinal investigation of social causation and social selection processes involved in the association between socioeconomic status and psychiatric disorders. *Journal of Abnormal Psychology*, 108(3), 490–499. <https://psycnet.apa.org/buy/1999-03409-014>

Jones, H. E. (2006). Drug Addiction During Pregnancy: Advances in Maternal Treatment and Understanding Child Outcomes. *Current Directions in Psychological Science*, 15(3), 126–130. <https://doi.org/10.1111/J.0963-7214.2006.00421.X>

Jones, L. (2004). The Prevalence and Characteristics of Substance Abusers in a Child Protective Service Sample. *Journal of Social Work Practice in the Addictions*, 4(2), 33–50. https://doi.org/10.1300/J160v04n02_04

Joosen, K. J., Mesman, J., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2012). Maternal sensitivity to infants in various settings predicts harsh discipline in toddlerhood. *Attachment and Human Development*. <https://doi.org/10.1080/14616734.2012.661217>

Juffer, F., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2007). *Promoting positive parenting: An attachment-based intervention*. Lawrence Erlbaum.

Juffer, F., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2008). *Promoting positive parenting: An attachment-based intervention*. Taylor & Francis Group/Lawrence Erlbaum Associates.

Juffer, F., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2017). Pairing attachment theory and social learning theory in video-feedback intervention to promote positive parenting. In *Current Opinion in Psychology*. <https://doi.org/10.1016/j.copsyc.2017.03.012>

Kaitz, M., Maytal, H. R., Devor, N., Bergman, L., & Mankuta, D. (2010). Maternal anxiety, mother–infant interactions, and infants’ response to challenge. *Infant Behavior and Development*, 33(2), 136–148. <https://doi.org/10.1016/J.INFBEH.2009.12.003>

- Kalinauskiene, L., Cekuoliene, D., van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., Juffer, F., & Kusakovskaja, I. (2009). Supporting insensitive mothers: the Vilnius randomized control trial of video-feedback intervention to promote maternal sensitivity and infant attachment security. *Child: Care, Health and Development*, 35(5), 613–623. <https://doi.org/10.1111/j.1365-2214.2009.00962.x>
- Kang, S. Y., Magura, S., Laudet, A., & Whitney, S. (1999). Adverse effect of child abuse victimization among substance-using women in treatment. *Journal of Interpersonal Violence*. <https://doi.org/10.1177/088626099014006006>
- Kelly, R. (2002). Psychiatric and substance use disorders as risk factors for low birth weight and preterm delivery. *Obstetrics & Gynecology*, 100(2), 297–304. [https://doi.org/10.1016/S0029-7844\(02\)02014-8](https://doi.org/10.1016/S0029-7844(02)02014-8)
- Kelly, R. H., Zatzick, D. F., & Anders, T. F. (2001). The Detection and Treatment of Psychiatric Disorders and Substance Use Among Pregnant Women Cared for in Obstetrics. *The American Journal of Psychiatry*, 158(2), 213–219. <https://doi.org/10.1176/APPI.AJP.158.2.213>
- Kenny, D. A., & Judd, C. M. (2014). Power Anomalies in Testing Mediation. *Psychological Science*, 25(2), 334–339. <https://doi.org/10.1177/0956797613502676>
- Kessels, R. P. C., Van Zandvoort, M. J. E., Postma, A., Kappelle, L. J., & De Haan, E. H. F. (2000). The Corsi Block-Tapping Task: Standardization and normative data. *Applied Neuropsychology*. https://doi.org/10.1207/S15324826AN0704_8
- Kessler, R. C. (2004). The epidemiology of dual diagnosis. In *Biological Psychiatry*. <https://doi.org/10.1016/j.biopsych.2004.06.034>
- Kettenring, J. R. (2006). The Practice of Cluster Analysis. *Journal of Classification* 23:1, 23(1), 3–30. <https://doi.org/10.1007/S00357-006-0002-6>
- Kienberger, P., And, J., Ekwo, E., & Van Voorhis, J. (1995). Association of drug abuse and child abuse. *Child Abuse & Neglect*, 19(9), 1065–1075.
- Kiff, C. J., Lengua, L. J., & Zalewski, M. (2011). Nature and Nurturing: Parenting in the Context of Child Temperament. *Clinical Child and Family Psychology Review*, 14(3), 251–301. <https://doi.org/10.1007/s10567-011-0093-4>
- Kilpatrick, D. G., Acierno, R., Saunders, B., Resnick, H. S., Best, C. L., & Schnurr, P. P. (2000). Risk factors for adolescent substance abuse and dependence: Data from a national sample. *Journal of Consulting and Clinical Psychology*, 68(1), 19–30. <https://doi.org/10.1037/0022-006X.68.1.19>
- Kim, P., Leckman, J. F., Mayes, L. C., Feldman, R., Wang, X., & Swain, J. E. (2010). The plasticity of human maternal brain: Longitudinal changes in brain anatomy during the early postpartum period. *Behavioral Neuroscience*, 124(5), 695–700. <https://doi.org/10.1037/a0020884>
- Kim, S., Iyengar, U., Mayes, L. C., Potenza, M. N., Rutherford, H. J. V., & Strathearn, L. (2017). Mothers with substance addictions show reduced reward responses when viewing their own infant's face. *Human Brain Mapping*, 38(11), 5421–5439. <https://doi.org/10.1002/hbm.23731>
- Kim, S., Kwok, S., Mayes, L. C., Potenza, M. N., Rutherford, H. J. V., & Strathearn, L. (2017). Early adverse experience and substance addiction: dopamine, oxytocin, and glucocorticoid pathways. *Annals of the New York Academy of Sciences*, 1394(1), 74. <https://doi.org/10.1111/NYAS.13140>
- Kliwer, W., Borre, A., Wright, A. W., Jäggi, L., Drazdowski, T., & Zaharakis, N. (2016). Parental emotional competence and parenting in low-income families with adolescents. *Journal of Family Psychology*, 30(1), 33–42. <https://doi.org/10.1037/fam0000136>
- Knekt, P., Lindfors, O., Laaksonen, M. A., Renlund, C., Haaramo, P., Härkänen, T., & Virtala, E. (2011). Quasi-experimental study on the effectiveness of psychoanalysis, long-term and short-term psychotherapy on psychiatric symptoms, work ability and functional capacity during a 5-year follow-up. *Journal of Affective Disorders*, 132(1–2), 37–47. <https://doi.org/10.1016/J.JAD.2011.01.014>

- Knopik, V. S., Marceau, K., Bidwell, L. C., & Rolan, E. (2019). Prenatal substance exposure and offspring development: Does DNA methylation play a role? *Neurotoxicology and Teratology*, *71*, 50–63. <https://doi.org/10.1016/J.NTT.2018.01.009>
- Kofman, O. (2002). The role of prenatal stress in the etiology of developmental behavioural disorders. *Neuroscience & Biobehavioral Reviews*, *26*(4), 457–470. [https://doi.org/10.1016/S0149-7634\(02\)00015-5](https://doi.org/10.1016/S0149-7634(02)00015-5)
- Kok, R., Linting, M., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Jaddoe, V. W. V., Hofman, A., Verhulst, F. C., & Tiemeier, H. (2013). Maternal Sensitivity and Internalizing Problems: Evidence from Two Longitudinal Studies in Early Childhood. *Child Psychiatry & Human Development* *2013* *44*:6, *44*(6), 751–765. <https://doi.org/10.1007/S10578-013-0369-7>
- Kolb, B., Harker, A., & Gibb, R. (2017). Principles of plasticity in the developing brain. *Developmental Medicine & Child Neurology*, *59*(12), 1218–1223. <https://doi.org/10.1111/DMCN.13546>
- Kolijn, L., Huffmeijer, R., Van Den Bulk, B. G., Vrijhof, C. I., van Ijzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2020). Effects of the Video-feedback intervention to promote positive parenting and sensitive discipline on mothers' neural responses to child faces: A randomized controlled ERP study including pre- and post-intervention measures. *Social Neuroscience*. <https://doi.org/10.1080/17470919.2019.1660709>
- Konijnenberg, C. (2015). Methodological issues in assessing the impact of prenatal drug exposure. *Substance Abuse: Research and Treatment*, *9*(s2), 39–44. <https://journals.sagepub.com/doi/pdf/10.4137/SART.S23544>
- Krink, S., Muehlhan, C., Luyten, P., Romer, G., & Ramsauer, B. (2018). Parental Reflective Functioning Affects Sensitivity to Distress in Mothers with Postpartum Depression. *Journal of Child and Family Studies*, *27*(5), 1671–1681. <https://doi.org/10.1007/s10826-017-1000-5>
- Kuczkowski, K. M. (2007). The effects of drug abuse on pregnancy. *Current Opinion in Obstetrics and Gynecology*, *19*(6), 578–585. <https://doi.org/10.1097/GCO.0B013E3282F1BF17>
- LaGasse, L. L. (2003). Prenatal drug exposure and maternal and infant feeding behaviour. *Archives of Disease in Childhood - Fetal and Neonatal Edition*, *88*(5), 391F – 399. <https://doi.org/10.1136/fn.88.5.F391>
- Lambert, K. G. (2012). The parental brain: Transformations and adaptations. *Physiology and Behavior*, *107*(5), 792–800. <https://doi.org/10.1016/j.physbeh.2012.03.018>
- Landi, N., Montoya, J., Kober, H., Rutherford, H. J. V., Mencl, W. E., Worhunsky, P. D., Potenza, M. N., & Mayes, L. C. (2011a). Maternal neural responses to infant cries and faces: Relationships with substance use. *Frontiers in Psychiatry*. <https://doi.org/10.3389/fpsy.2011.00032>
- Landi, N., Montoya, J., Kober, H., Rutherford, H. J. V., Mencl, W. E., Worhunsky, P. D., Potenza, M. N., & Mayes, L. C. (2011b). Maternal Neural Responses to Infant Cries and Faces: Relationships with Substance Use. *Frontiers in Psychiatry*, *2*. <https://doi.org/10.3389/fpsy.2011.00032>
- Landis, R. S., Beal, D. J., & Tesluk, P. E. (2000). A Comparison of Approaches to Forming Composite Measures in Structural Equation Models. In *Organizational Research Methods* (Vol. 3, Issue 2, pp. 186–207). <https://doi.org/10.1177/109442810032003>
- Laurent, H. K., & Ablow, J. C. (2012). A cry in the dark: depressed mothers show reduced neural activation to their own infant's cry. *Social Cognitive and Affective Neuroscience*, *7*(2), 125–134. <https://doi.org/10.1093/SCAN/NSQ091>
- Lecompte, V., Robins, S., King, L., Solomonova, E., Khan, N., Moss, E., Nagy, C., Feeley, N., Gold, I., Hayton, B., Turecki, G., & Zekowicz, P. (2020). Examining the role of mother-child interactions and DNA methylation of the oxytocin receptor gene in understanding child controlling attachment behaviors. *Attachment & Human Development*, *23*(1), 37–55. <https://doi.org/10.1080/14616734.2019.1708422>

- Lehman, E. B., Steier, A. J., Guidash, K. M., & Wanna, S. Y. (2010). Predictors of Compliance in Toddlers: Child Temperament, Maternal Personality, and Emotional Availability. Portions of the research were presented at the Conference on Human Development, Mobile, AL, March 6, 1998. *Early Child Development and Care*, 172(3), 301–310. <https://doi.org/10.1080/03004430212124>
- Lehto, J. E., Juujärvi, P., Kooistra, L., & Pulkkinen, L. (2003). Dimensions of executive functioning: Evidence from children. *British Journal of Developmental Psychology*. <https://doi.org/10.1348/026151003321164627>
- Leve, L. D., Harold, G. T., Ge, X., Neiderhiser, J. M., Shaw, D., Scaramella, L. V., & Reiss, D. (2009). Structured Parenting of Toddlers at High versus Low Genetic Risk: Two Pathways to Child Problems. *Journal of the American Academy of Child and Adolescent Psychiatry*, 48(11), 1102. <https://doi.org/10.1097/CHI.0B013E3181B8BFC0>
- Levesque, M. L., Fahim, C., Ismaylova, E., Verner, M. P., Casey, K. F., Vitaro, F., Brendgen, M., Dionne, G., Boivin, M., Tremblay, R. E., & Booij, L. (2015). The Impact of the in utero and Early Postnatal Environments on Grey and White Matter Volume: A Study with Adolescent Monozygotic Twins. *Developmental Neuroscience*, 37(6), 489–496. <https://doi.org/10.1159/000430982>
- LeVine, R. A. (1988). Human parental care: Universal goals, cultural strategies, individual behavior. *New Directions for Child and Adolescent Development*, 1988(40), 3–12. <https://doi.org/10.1002/CD.23219884003>
- Lewis, B. A., Singer, L. T., Short, E. J., Minnes, S., Arendt, R., Weishampel, P., Klein, N., & Min, M. O. (2004). Four-year language outcomes of children exposed to cocaine in utero. *Neurotoxicology and Teratology*, 26(5), 617–627. <https://doi.org/10.1016/j.ntt.2004.06.007>
- Licata, M., Kristen, S., & Sodian, B. (2016). Mother-Child Interaction as a Cradle of Theory of Mind: The Role of Maternal Emotional Availability. *Social Development*, 25(1), 139–156. <https://doi.org/10.1111/sode.12131>
- Lindsay, J., & Ciarrochi, J. (2009). Substance abusers report being more alexithymic than others but do not show emotional processing deficits on a performance measure of alexithymia. *Addiction Research & Theory*, 17(3), 315–321. <https://doi.org/10.1080/16066350802472056>
- LoBue, V., & Thrasher, C. (2015). The Child Affective Facial Expression (CAFE) set: validity and reliability from untrained adults. *Frontiers in Psychology*, 5. <https://doi.org/10.3389/fpsyg.2014.01532>
- Loeber, S., Vollstädt-Klein, S., von der Goltz, C., Flor, H., Mann, K., & Kiefer, F. (2009). Attentional bias in alcohol-dependent patients: the role of chronicity and executive functioning. *Addiction Biology*, 14(2), 194–203. <https://doi.org/10.1111/j.1369-1600.2009.00146.x>
- Lorber, M. F., O’Leary, S. G., & Kendziora, K. T. (2003). Mothers’ Overreactive Discipline and Their Encoding and Appraisals of Toddler Behavior. *Journal of Abnormal Child Psychology* 2003 31:5, 31(5), 485–494. <https://doi.org/10.1023/A:1025496914522>
- Lorenz, K. (1943). Die angeborenen Formen möglicher Erfahrung. *Zeitschrift Für Tierpsychologie*. <https://doi.org/10.1111/j.1439-0310.1943.tb00655.x>
- Lorenz, K. (1971). Über tierisches und menschliches Verhalten. Aus dem Werdegang der Verhaltenslehre. *Ges. Abhandlungen*.
- Lowell, A. F., Maupin, A. N., Landi, N., Potenza, M. N., Mayes, L. C., & Rutherford, H. J. V. (2020). Substance use and mothers’ neural responses to infant cues. *Infant Mental Health Journal*. <https://doi.org/10.1002/imhj.21835>
- Lubman, D. I., Yücel, M., & Pantelis, C. (2004). Addiction, a condition of compulsive behaviour? Neuroimaging and neuropsychological evidence of inhibitory dysregulation. In *Addiction*. <https://doi.org/10.1111/j.1360-0443.2004.00808.x>
- Luminet, O., Vermeulen, N., Demaret, C., Taylor, G. J., & Bagby, R. M. (2006). Alexithymia and levels of

- processing: Evidence for an overall deficit in remembering emotion words. *Journal of Research in Personality*, 40(5), 713–733. <https://doi.org/10.1016/j.jrp.2005.09.001>
- Lunt, L., Bramham, J., Morris, R. G., Bullock, P. R., Selway, R. P., Xenitidis, K., & David, A. S. (2012). Prefrontal cortex dysfunction and “Jumping to Conclusions”: Bias or deficit? *Journal of Neuropsychology*. <https://doi.org/10.1111/j.1748-6653.2011.02005.x>
- Luthar, S. S., Suchman, N. E., & Altomare, M. (2007). Relational Psychotherapy Mothers’ Group: A randomized clinical trial for substance abusing mothers. *Development and Psychopathology*, 19(1), 243–261. <https://doi.org/10.1017/S0954579407070137>
- Luyten, P., Mayes, L. C., Nijssens, L., & Fonagy, P. (2017). The parental reflective functioning questionnaire: Development and preliminary validation. *PLoS ONE*, 12(5), e0176218. <https://doi.org/10.1371/journal.pone.0176218>
- Luyten, P., Nijssens, L., Fonagy, P., & Mayes, L. C. (2017). Parental Reflective Functioning: Theory, Research, and Clinical Applications. *The Psychoanalytic Study of the Child*, 70(1), 174–199. <https://doi.org/10.1080/00797308.2016.1277901>
- Lyons-Ruth, K., Bureau, J.-F., Easterbrooks, M. A., Obsuth, I., Hennighausen, K., & Vulliez-Coady, L. (2013). Parsing the construct of maternal insensitivity: distinct longitudinal pathways associated with early maternal withdrawal. *Attachment & Human Development*, 15(5), 562–582. <https://doi.org/10.1080/14616734.2013.841051>
- Lyons-Ruth, K., Melnick, S., Bronfman, E., Sherry, S., & Llanas, L. (2003). Hostile-helpless relational models and disorganized attachment patterns between parents and their young children: Review of research and implications for clinical work. In *Attachment Issues in Psychopathology and Intervention*. <https://doi.org/10.4324/9781410609670>
- MacCallum, R. C., Zhang, S., Preacher, K. J., & Rucker, D. D. (2002). On the practice of dichotomization of quantitative variables. *Psychological Methods*, 7(1), 19–40. <https://doi.org/10.1037/1082-989X.7.1.19>
- Mager, D. E., & Janca, A. (1992). Posttraumatic stress disorder among substance users in the general population. *Article in American Journal of Psychiatry*. <https://doi.org/10.1176/ajp.149.5.664>
- Mahler, M. S., Pine, F., & Bergman, A. (1975). *The Psychological Birth of the Human Infant. Symbiosis and Individuation*. Basic books.
- Malak, S. M., Crowley, M. J., Mayes, L. C., & Rutherford, H. J. V. (2015). Maternal anxiety and neural responses to infant faces. *Journal of Affective Disorders*, 172, 324–330. <https://doi.org/10.1016/j.jad.2014.10.013>
- Mansoor, E., Morrow, C. E., Accornero, V. H., Xue, L., Johnson, A. L., Anthony, J. C., & Bandstra, E. S. (2012). Longitudinal Effects of Prenatal Cocaine Use on Mother-Child Interactions at Ages 3 and 5. *Journal of Developmental and Behavioral Pediatrics : JDBP*, 33(1), 32. <https://doi.org/10.1097/DBP.0B013E31823968AB>
- Mark F. Testa, & Brenda Smith. (2009). Prevention and Drug Treatment. *The Future of Children*, 19(2), 147–168. <https://doi.org/10.1353/foc.0.0033>
- Martins, C., & Gaffan, E. A. (2000). Effects of Early Maternal Depression on Patterns of Infant–Mother Attachment: A Meta-analytic Investigation. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, 41(6), 737–746. <https://doi.org/10.1111/1469-7610.00661>
- Matos, A. L., Moleiro, C., & Dias, J. G. (2014). Clusters of abusive parenting: A latent class analysis of families referred to Child Protective Services in Portugal. *Child Abuse and Neglect*. <https://doi.org/10.1016/j.chiabu.2014.10.018>
- Mattson, S. N., Schoenfeld, A. M., & Riley, E. P. (2001). Teratogenic Effects of Alcohol on Brain and Behavior. *Alcohol Research & Health*, 25(3), 185. [/pmc/articles/PMC6707166/](https://pubmed.ncbi.nlm.nih.gov/11111111/)

- Mayes, L. C., Grillon, C., Granger, R., & Schottenfeld, R. (1998). Regulation of Arousal and Attention in Preschool Children Exposed to Cocaine Prenatally. *Annals of the New York Academy of Sciences*, 846(1), 126–143. <https://doi.org/10.1111/J.1749-6632.1998.TB09731.X>
- McCoy, C. E. (2017). Understanding the intention-to-treat principle in randomized controlled trials. In *Western Journal of Emergency Medicine* (Vol. 18, Issue 6, pp. 1075–1078). eScholarship. <https://doi.org/10.5811/westjem.2017.8.35985>
- McCrary, B. S., & Smith, D. E. (1986). Implications of Cognitive Impairment for the Treatment of Alcoholism. *Alcoholism: Clinical and Experimental Research*. <https://doi.org/10.1111/j.1530-0277.1986.tb05061.x>
- McMahon, T. J., & Rounsaville, B. J. (2002). Substance abuse and fathering: Adding poppa to the research agenda. In *Addiction*. <https://doi.org/10.1046/j.1360-0443.2002.00159.x>
- McMahon, T. J., Winkel, J. D., & Rounsaville, B. J. (2008). Drug abuse and responsible fathering: A comparative study of men enrolled in methadone maintenance treatment. *Addiction*. <https://doi.org/10.1111/j.1360-0443.2007.02075.x>
- Meins, E. (1997). Security of attachment and maternal tutoring strategies: Interaction within the zone of proximal development. *British Journal of Developmental Psychology*, 15(2), 129–144. <https://doi.org/10.1111/j.2044-835X.1997.tb00730.x>
- Mesman, J., & Emmen, R. A. G. (2013). Mary Ainsworth’s legacy: a systematic review of observational instruments measuring parental sensitivity. *Attachment & Human Development*, 15(5–6), 485–506. <https://doi.org/10.1080/14616734.2013.820900>
- Messina, N., Calhoun, S., Conner, E., & Miller, M. (2015). Improving the outcomes of children affected by parental substance abuse: a review of randomized controlled trials. *Substance Abuse and Rehabilitation*, 6, 15. <https://doi.org/10.2147/sar.s46439>
- Millan, M. J., Agid, Y., Brüne, M., Bullmore, E. T., Carter, C. S., Clayton, N. S., Connor, R., Davis, S., Deakin, B., DeRubeis, R. J., Dubois, B., Geyer, M. A., Goodwin, G. M., Gorwood, P., Jay, T. M., Joëls, M., Mansuy, I. M., Meyer-Lindenberg, A., Murphy, D., ... Young, L. J. (2012). Cognitive dysfunction in psychiatric disorders: characteristics, causes and the quest for improved therapy. *Nature Reviews Drug Discovery* 2012 11:2, 11(2), 141–168. <https://doi.org/10.1038/nrd3628>
- Miller, E. K., & Cohen, J. D. (2001). An integrative theory of prefrontal cortex function. *Annual Review of Neuroscience*, 24(1), 167–202.
- Miller, K. M. (2006). The impact of parental incarceration on children: An emerging need for effective interventions. In *Child and Adolescent Social Work Journal* (Vol. 23, Issue 4, pp. 472–486). Springer. <https://doi.org/10.1007/s10560-006-0065-6>
- Miner, J. L., & Clarke-Stewart, K. A. (2008). Trajectories of Externalizing Behavior from Age 2 to Age 9: Relations With Gender, Temperament, Ethnicity, Parenting, and Rater. *Developmental Psychology*, 44(3), 771–786. <https://doi.org/10.1037/0012-1649.44.3.771>
- Mingo, M. V., & Easterbrooks, M. A. (2015). Patterns of emotional availability in mother–infant dyads: associations with multiple levels of context. *Infant Mental Health Journal*, 36(5), 469–482. <https://doi.org/10.1002/IMHJ.21529>
- Minkoff, K., Zweben, J., Rosenthal, R., & Ries, R. (2004). Development of Service Intensity Criteria and Program Categories for Individuals with Co-Occurring Disorders. *Journal of Addictive Diseases*, 22(SUPPL.1), 113–129. https://doi.org/10.1300/J069V22S01_08
- Minnes, S., Singer, L., Min, M. O., Wu, M., Lang, A., & Yoon, S. (2014). Effects of prenatal cocaine/polydrug exposure on substance use by age 15. *Drug and Alcohol Dependence*, 134(1), 201–210. <https://doi.org/10.1016/j.drugalcdep.2013.09.031>
- Minnes, S., Singer, L. T., Arendt, R., & Satayatham, S. (2005). Effects of prenatal cocaine/polydrug use on

maternal-infant feeding interactions during the first year of life. *Journal of Developmental and Behavioral Pediatrics*, 26(3), 194–200. <https://doi.org/10.1097/00004703-200506000-00005>

- Minnes, S., Singer, L. T., Humphrey-Wall, R., & Satayathum, S. (2008). Psychosocial and behavioral factors related to the post-partum placements of infants born to cocaine-using women. *Child Abuse & Neglect*, 32(3), 353–366. <https://doi.org/10.1016/j.chiabu.2007.12.002>
- Minnes, S., Singer, L. T., Kirchner, H. L., Short, E., Lewis, B., Satayathum, S., & Queh, D. (2010). The effects of prenatal cocaine exposure on problem behavior in children 4–10 years. *Neurotoxicology and Teratology*, 32(4), 443–451. <https://doi.org/10.1016/J.NTT.2010.03.005>
- Mirmiran, M., & Lunshof, S. (1996). Perinatal development of human circadian rhythms. *Progress in Brain Research*, 111, 217–226. [https://doi.org/10.1016/S0079-6123\(08\)60410-0](https://doi.org/10.1016/S0079-6123(08)60410-0)
- Misri, S., Reebye, P., Kendrick, K., Carter, D., Ryan, D., Grunau, R. E., & Oberlander, T. F. (2006). Internalizing behaviors in 4-year-old children exposed in utero to psychotropic medications. *American Journal of Psychiatry*. <https://doi.org/10.1176/ajp.2006.163.6.1026>
- Mitchell, T. (1997). *Machine Learning*. McGraw Hill.
- Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The Unity and Diversity of Executive Functions and Their Contributions to Complex “Frontal Lobe” Tasks: A Latent Variable Analysis. *Cognitive Psychology*. <https://doi.org/10.1006/cogp.1999.0734>
- Möller, C., Odersjö, C., Pilesjö, F., Terpening, K., Österberg, M., & Holmqvist, R. (2017). Reflective Functioning, Limit Setting, and Emotional Availability in Mother–Child Dyads. *Parenting*. <https://doi.org/10.1080/15295192.2017.1369311>
- Mondini, S., Mapelli, D., Vestri, A., Arcara, G., & Bisiacchi, P. S. (2011). *L'Esame Neuropsicologico Breve-2*. Raffaello Cortina Editore.
- Mondini, S., Mapelli, D., Vestri, A., & Bisiacchi, P. S. (2003). *Esame Neuropsicologico Breve*. Raffaello Cortina Editore.
- Monk, C., Kovelenco, P., Ellman, L. M., Sloan, R. P., Bagiella, E., Gorman, J. M., & Pine, D. S. (2001). Enhanced stress reactivity in paediatric anxiety disorders: implications for future cardiovascular health. *International Journal of Neuropsychopharmacology*, 4(2), 199–206. <https://doi.org/10.1017/S146114570100236X>
- Montoya, A. K., & Hayes, A. F. (2017). Two-condition within-participant statistical mediation analysis: A path-analytic framework. *Psychological Methods*, 22(1), 6–27. <https://doi.org/10.1037/met0000086>
- Moriguchi, Y., Ohnishi, T., Lane, R. D., Maeda, M., Mori, T., Nemoto, K., Matsuda, H., & Komaki, G. (2006). Impaired self-awareness and theory of mind: An fMRI study of mentalizing in alexithymia. *NeuroImage*. <https://doi.org/10.1016/j.neuroimage.2006.04.186>
- Morris, A. S., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The Role of the Family Context in the Development of Emotion Regulation. *Social Development*, 16(2), 361–388. <https://doi.org/10.1111/J.1467-9507.2007.00389.X>
- Mueller, S. T., & Piper, B. J. (2014). The Psychology Experiment Building Language (PEBL) and PEBL Test Battery. *Journal of Neuroscience Methods*. <https://doi.org/10.1016/j.jneumeth.2013.10.024>
- Murray, L., Creswell, C., & Cooper, P. J. (2009). The development of anxiety disorders in childhood: an integrative review. *Psychological Medicine*, 39(9), 1413–1423. <https://doi.org/10.1017/S0033291709005157>
- Murray, L., Fearon, P., & Cooper, P. (2015). *Identifying Perinatal Depression and Anxiety* (J. Milgrom & A. W. Gemmill (eds.)). John Wiley & Sons, Ltd. <https://doi.org/10.1002/9781118509722>
- Murray, L., Halligan, S., & Cooper, P. (2010). Effects of postnatal depression on mother-infant interactions, and child development - CentAUR. In J. Bremner & T. Wachs (Eds.), *Handbook of infant development*

(2nd ed., Vol. 2, pp. 192–220). Wiley-Blackwell. <http://centaur.reading.ac.uk/28515/>

- Nachoum, R., Moed, A., Madjar, N., & Kanat-Maymon, Y. (2021). Prenatal childbearing motivations, parenting styles, and child adjustment: A longitudinal study. *Journal of Family Psychology, 35*(6), 715–724. <https://doi.org/10.1037/FAM0000826>
- Nair, P., Schuler, M. E., Black, M. M., Kettinger, L., & Harrington, D. (2003). Cumulative environmental risk in substance abusing women: Early intervention, parenting stress, child abuse potential and child development. *Child Abuse and Neglect, 27*(9), 997–1017. [https://doi.org/10.1016/S0145-2134\(03\)00169-8](https://doi.org/10.1016/S0145-2134(03)00169-8)
- Näslund, B., Persson-Blennow, I., McNeil, T., Kaij, L., & Malmquist-Larsson, A. (1984). Offspring of women with nonorganic psychosis: infant attachment to the mother at one year of age. *Acta Psychiatrica Scandinavica, 69*(3), 231–241. <https://doi.org/10.1111/J.1600-0447.1984.TB02490.X>
- Nath, S., Pearson, R. M., Moran, P., Pawlby, S., Molyneaux, E., Challacombe, F. L., & Howard, L. M. (2019). The association between prenatal maternal anxiety disorders and postpartum perceived and observed mother-infant relationship quality. *Journal of Anxiety Disorders, 68*, 102148. <https://doi.org/10.1016/J.JANXDIS.2019.102148>
- Neitzel, C., & Stright, A. D. (2004). Parenting behaviours during child problem solving: The roles of child temperament, mother education and personality, and the problem-solving context. *International Journal of Behavioral Development, 28*(2), 166–179. <https://doi.org/10.1080/01650250344000370>
- Nelson, H. E. (1976). A Modified Card Sorting Test Sensitive to Frontal Lobe Defects. *Cortex*. [https://doi.org/10.1016/S0010-9452\(76\)80035-4](https://doi.org/10.1016/S0010-9452(76)80035-4)
- Nemiah, J. C., Freyberger, H., & Sifneos, P. E. (1976). Alexithymia: A view of the psychosomatic process. In O. W. Hill (Ed.), *Modern trends in psychosomatic medicine* (pp. 430–439). Butterworths.
- Neppl, T. K., Diggs, O. N., & Cleveland, M. J. (2020). The intergenerational transmission of harsh parenting, substance use, and emotional distress: Impact on the third-generation child. *Psychology of Addictive Behaviors, 34*(8), 852–863. <https://doi.org/10.1037/ADB0000551>
- Neuspiel, D. R., Hamel, S. C., Hochberg, E., Greene, J., & Campbell, D. (1991). Maternal cocaine use and infant behavior. *Neurotoxicology and Teratology, 13*(2), 229–233. [https://doi.org/10.1016/0892-0362\(91\)90015-O](https://doi.org/10.1016/0892-0362(91)90015-O)
- Newton, E. K., Laible, D., Carlo, G., Steele, J. S., & McGinley, M. (2014). Do sensitive parents foster kind children, or vice versa? Bidirectional influences between children’s prosocial behavior and parental sensitivity. *Developmental Psychology, 50*(6), 1808–1816. <https://doi.org/10.1037/a0036495>
- Niccols, A., Milligan, K., Smith, A., Sword, W., Thabane, L., & Henderson, J. (2012). Integrated programs for mothers with substance abuse issues and their children: A systematic review of studies reporting on child outcomes. *Child Abuse and Neglect*. <https://doi.org/10.1016/j.chiabu.2011.10.007>
- Niccols, A., Milligan, K., Sword, W., Thabane, L., Henderson, J., Smith, A., Liu, J., & Jack, S. (2010). Maternal Mental Health and Integrated Programs for Mothers With Substance Abuse Issues. *Psychology of Addictive Behaviors, 24*(3), 466–474. <https://doi.org/10.1037/A0020139>
- Nicol-Harper, R., Harvey, A. G., & Stein, A. (2007). Interactions between mother and infants: Impact of maternal anxiety. *Infant Behavior and Development, 30*(1), 161–167.
- Nigg, J. T., Jester, J. M., Stavro, G. M., Ip, K. I., Putter, L. I., & Zucker, R. A. (2017). Specificity of Executive Functioning and Processing Speed Problems in Common Psychopathology. *Neuropsychology*. <https://doi.org/10.1037/neu0000343>
- O’Connor, M. J., Kogan, N., & Findlay, R. (2002). Prenatal alcohol exposure and attachment behavior in children. *Alcoholism: Clinical and Experimental Research, 26*(10), 1592–1602. <https://doi.org/10.1111/J.1530-0277.2002.TB02460.X>

- O'Donnell, M., Nassar, N., Leonard, H., Hagan, R., Mathews, R., Patterson, Y., & Stanley, F. (2009). Increasing Prevalence of Neonatal Withdrawal Syndrome: Population Study of Maternal Factors and Child Protection Involvement. *Pediatrics*, *123*(4), e614–e621. <https://doi.org/10.1542/peds.2008-2888>
- O'Farrelly, C., Watt, H., Babalis, D., Bakermans-Kranenburg, M. J., Barker, B., Byford, S., Ganguli, P., Grimas, E., Iles, J., Mattock, H., McGinley, J., Phillips, C., Ryan, R., Scott, S., Smith, J., Stein, A., Stevens, E., van Ijzendoorn, M. H., Warwick, J., & Ramchandani, P. G. (2021). A Brief Home-Based Parenting Intervention to Reduce Behavior Problems in Young Children: A Pragmatic Randomized Clinical Trial. *JAMA Pediatrics*, *175*(6), 567–576. <https://doi.org/10.1001/jamapediatrics.2020.6834>
- O'hara, M. W., & Swain, A. M. (1996). Rates and risk of postpartum depression—a meta-analysis. *International Review of Psychiatry*, *8*(1), 37–54. <https://doi.org/10.3109/09540269609037816>
- Obradović, J., Yousafzai, A. K., Finch, J. E., & Rasheed, M. A. (2016). Maternal scaffolding and home stimulation: Key mediators of early intervention effects on children's cognitive development. *Developmental Psychology*, *52*(9), 1409–1421. <https://doi.org/10.1037/dev0000182>
- Ochsner, K. N., & Gross, J. J. (2008). Cognitive Emotion Regulation: Insights From Social Cognitive and Affective Neuroscience. *Current Direction in Psychological Science*, *17*(2), 153–158. <https://doi.org/10.1111/J.1467-8721.2008.00566.X>
- Okado, Y., & Azar, S. T. (2011). The Impact of Extreme Emotional Distance in the Mother-Child Relationship on the Offspring's Future Risk of Maltreatment Perpetration. *Journal of Family Violence*, *26*, 439–452. <https://doi.org/10.1007/s10896-011-9378-0>
- Olsen, A. (2015). Punishing parents: Child removal in the context of drug use. *Drug and Alcohol Review*, *34*(1), 27–30. <https://doi.org/10.1111/dar.12219>
- Oyefeso, A., Brown, S., Chiang, Y., & Clancy, C. (2008). Self-injurious behaviour, traumatic life events and alexithymia among treatment-seeking opiate addicts: Prevalence, pattern and correlates. *Drug and Alcohol Dependence*, *98*(3), 227–234. <https://doi.org/10.1016/j.drugalcdep.2008.06.004>
- Padwa, H., Larkins, S., Crevecoeur-MacPhail, D. A., & Grella, C. E. (2013). Dual Diagnosis Capability in Mental Health and Substance Use Disorder Treatment Programs. *Journal of Dual Diagnosis*, *9*(2), 179. <https://doi.org/10.1080/15504263.2013.778441>
- Pajulo, Marjaterthu, Savonlahti, E., Sourander, A., Ahlqvist, S., Helenius, H., & Piha, J. (2001). An early report on the mother–baby interactive capacity of substance-abusing mothers. *Journal of Substance Abuse Treatment*, *20*(2), 143–151. [https://doi.org/10.1016/S0740-5472\(00\)00161-6](https://doi.org/10.1016/S0740-5472(00)00161-6)
- Pajulo, Marjukka, Pyykkönen, N., Kalland, M., Sinkkonen, J., Helenius, H., Punamäki, R. L., & Suchman, N. (2012). Substance-abusing mothers in residential treatment with their babies: Importance of pre- and postnatal maternal reflective functioning. *Infant Mental Health Journal*. <https://doi.org/10.1002/imhj.20342>
- Pajulo, Marjukka, Suchman, N., Kalland, M., Sinkkonen, J., Helenius, H., & Mayes, L. (2008). Role of Maternal Reflective Ability for Substance Abusing Mothers. *Journal of Prenatal & Perinatal Psychology & Health*.
- Panksepp, J. (2009). Primary Process Affects and Brain Oxytocin. *Biological Psychiatry*, *65*(9), 725–727. <https://doi.org/10.1016/J.BIOPSYCH.2009.02.004>
- Papoušek, M. (2007). Communication in early infancy: An arena of intersubjective learning. *Infant Behavior and Development*, *30*(2), 258–266. <https://doi.org/10.1016/J.INFBEH.2007.02.003>
- Parolin, M., Miscioscia, M., De Carli, P., Cristofalo, P., Gatta, M., & Simonelli, A. (2018). Alexithymia in Young Adults With Substance Use Disorders: Critical Issues About Specificity and Treatment Predictivity. *Frontiers in Psychology*, *9*. <https://doi.org/10.3389/fpsyg.2018.00645>
- Parolin, M., & Simonelli, A. (2016). Attachment Theory and Maternal Drug Addiction: The Contribution to Parenting Interventions. *Frontiers in Psychiatry*, *7*. <https://doi.org/10.3389/fpsyg.2016.00152>

- Parolin, M., Simonelli, A., Mapelli, D., Sacco, M., & Cristofalo, P. (2016). Parental Substance Abuse As an Early Traumatic Event. Preliminary Findings on Neuropsychological and Personality Functioning in Young Drug Addicts Exposed to Drugs Early. *Frontiers in Psychology*, 7. <https://doi.org/10.3389/fpsyg.2016.00887>
- Pasche, S. (2012). Exploring the Comorbidity of Anxiety and Substance Use Disorders. *Current Psychiatry Reports* 2012 14:3, 14(3), 176–181. <https://doi.org/10.1007/S11920-012-0264-0>
- Patrick, S. W., Schumacher, R. E., Benneyworth, B. D., Krans, E. E., McAllister, J. M., & Davis, M. M. (2012). Neonatal Abstinence Syndrome and Associated Health Care Expenditures. *JAMA*, 307(18). <https://doi.org/10.1001/jama.2012.3951>
- Patterson, G. R. (1982). Coercive family processes. In *Eugene: Castalia*.
- Paulussen-Hoogbeem, M. C., Stams, G. J. J. M., Hermanns, J. M. A., & Peetsma, T. T. D. (2007). Child negative emotionality and parenting from infancy to preschool: A meta-analytic review. *Developmental Psychology*, 43(2), 438–453. <https://doi.org/10.1037/0012-1649.43.2.438>
- Peacock, A., Leung, J., Larney, S., Colledge, S., Hickman, M., Rehm, J., Giovino, G. A., West, R., Hall, W., Griffiths, P., Ali, R., Gowing, L., Marsden, J., Ferrari, A. J., Grebely, J., Farrell, M., & Degenhardt, L. (2018). Global statistics on alcohol, tobacco and illicit drug use: 2017 status report. *Addiction*, 113(10), 1905–1926. <https://doi.org/10.1111/ADD.14234>
- Pears, K., Capaldi, D. M., & Owen, L. D. (2007). Substance Use Risk Across Three Generations: The Roles of Parent Discipline Practices and Inhibitory Control. *Psychology of Addictive Behaviors*, 21(3), 373–386. <https://doi.org/10.1037/0893-164X.21.3.373>
- Pearson, R. M., & Lightman, S. L. (2013). Attentional processing of infant emotion during pregnancy and how it is related to depressive symptoms and mother-infant relationships after birth. In *Archives of Women's Mental Health*.
- Pearson, Rebecca M., Lightman, S. L., & Evans, J. (2011). Attentional processing of infant emotion during late pregnancy and mother-infant relations after birth. *Archives of Women's Mental Health*. <https://doi.org/10.1007/s00737-010-0180-4>
- Pederson, D. R., Gleason, K. E., Moran, G., & Bento, S. (1998). Maternal attachment representations, maternal sensitivity, and the infant-mother attachment relationship. *Developmental Psychology*, 34(5), 925–933. <https://doi.org/10.1037/0012-1649.34.5.925>
- Pederson, David R., Bailey, H. N., Tarabulsky, G. M., Bento, S., & Moran, G. (2014). Understanding sensitivity: lessons learned from the legacy of Mary Ainsworth. *Attachment & Human Development*, 16(3), 261–270. <https://doi.org/10.1080/14616734.2014.900094>
- Peleg-Oren, N., & Teichman, M. (2006). Young children of parents with Substance Use Disorders (SUD): A review of the literature and implications for social work practice. In *Journal of Social Work Practice in the Addictions* (Vol. 6, Issues 1–2, pp. 49–61). Taylor & Francis Group . https://doi.org/10.1300/J160v06n01_03
- Pereira, M., Negrão, M., Soares, I., & Mesman, J. (2014). DECREASING HARSH DISCIPLINE IN MOTHERS AT RISK FOR MALTREATMENT: A RANDOMIZED CONTROL TRIAL. *Infant Mental Health Journal*, 35(6), 604–613. <https://doi.org/10.1002/imhj.21464>
- Petry, N. M., & Bickel, W. K. (2000). Gender differences in hostility of opioid-dependent outpatients: role in early treatment termination. *Drug and Alcohol Dependence*, 58(1–2), 27–33. [https://doi.org/10.1016/S0376-8716\(99\)00058-7](https://doi.org/10.1016/S0376-8716(99)00058-7)
- Phillips, L. H., Wynn, V., Gilhooly, K. J., Della Sala, S., & Logie, R. H. (1999). The Role of Memory in the Tower of London Task. *Memory*. <https://doi.org/10.1080/741944066>
- Pinderhughes, E. E., Bates, J. E., Dodge, K. A., Pettit, G. S., & Zelli, A. (2000). Discipline responses: Influences of parents' socioeconomic status, ethnicity, beliefs about parenting, stress, and cognitive-

emotional processes. *Journal of Family Psychology*. <https://doi.org/10.1037/0893-3200.14.3.380>

- Piper, B. J., Li, V., Eiwaz, M. A., Kobel, Y. V., Benice, T. S., Chu, A. M., Olsen, R. H. J., Rice, D. Z., Gray, H. M., & Mueller, S. T. (2012). Executive function on the Psychology Experiment Building Language tests. *Behavior Research Methods*. <https://doi.org/10.3758/s13428-011-0096-6>
- Porreca, A., Biringen, Z., Parolin, M., Saunders, H., Ballarotto, G., & Simonelli, A. (2018). Emotional Availability, Neuropsychological Functioning, and Psychopathology: The Context of Parental Substance Use Disorder. *BioMed Research International*, 2018. <https://doi.org/10.1155/2018/5359037>
- Porreca, A., De Carli, P., Filippi, B., Parolin, M., & Simonelli, A. (2020). Mothers' alexithymia in the context of parental Substance Use Disorder: Which implications for parenting behaviors? *Child Abuse and Neglect*, 108, 104690. <https://doi.org/10.1016/j.chiabu.2020.104690>
- Porreca, A., De Palo, F., & Simonelli, A. (2015). New perspectives in the study of adult-child bond: Attachment, dyadic emotional availability and the Emotional Availability Scales (EAS). *Attaccamento e Sistemi Complessi (Attachment and Complex Systems)*, 2(2), 31–52.
- Porreca, A., De Palo, F., Simonelli, A., & Capra, N. (2016). Attachment Representations and Early Interactions in Drug Addicted Mothers: A Case Study of Four Women with Distinct Adult Attachment Interview Classifications. *Frontiers in Psychology*, 7(MAR). <https://doi.org/10.3389/fpsyg.2016.00346>
- Posada, G., Trumbell, J., Noblega, M., Plata, S., Peña, P., Carbonell, O. A., & Lu, T. (2016). Maternal Sensitivity and Child Secure Base Use in Early Childhood: Studies in Different Cultural Contexts. *Child Development*, 87(1), 297–311. <https://doi.org/10.1111/CDEV.12454>
- Preece, D. A., Mehta, A., Becerra, R., Chen, W., Allan, A., Robinson, K., Boyes, M., Hasking, P., & Gross, J. J. (2022). Why is alexithymia a risk factor for affective disorder symptoms? The role of emotion regulation. *Journal of Affective Disorders*, 296, 337–341. <https://doi.org/10.1016/J.JAD.2021.09.085>
- Prindle, J. J., Hammond, I., & Putnam-Hornstein, E. (2018). Prenatal substance exposure diagnosed at birth and infant involvement with child protective services. *Child Abuse & Neglect*, 76, 75–83. <https://doi.org/10.1016/j.chiabu.2017.10.002>
- Pulsifer, M. B., Butz, A. M., Foran, M. O., & Belcher, H. M. E. (2007). Prenatal Drug Exposure: Effects on Cognitive Functioning at 5 Years of Age: *Clinical Pediatrics*, 47(1), 58–65. <https://doi.org/10.1177/0009922807305872>
- Putnam, S. P., Sanson, A. V., & Rothbart, M. K. (2002). Child temperament and parenting. In *Handbook of parenting 1* (pp. 255–277).
- Pearson, R. M., Cooper, R. M., Penton-Voak, I. S., Lightman, S. L., & Evans, J. (2010). Depressive symptoms in early pregnancy disrupt attentional processing of infant emotion. *Psychological medicine*, 40(4), 621–631.
- R Development Core Team. (2021). *The R Project for Statistical Computing* (R. D. C. Team (ed.)). R Foundation for Statistical Computing.
- Ragins, N., Schachter, J., Elmer, E., Preisman, R., Bowes, A. E., & Harway, V. (1975). Infants and Children at Risk for Schizophrenia: Environmental and Developmental Observations. *Journal of the American Academy of Child Psychiatry*, 14(1), 150–177. [https://doi.org/10.1016/S0002-7138\(09\)61391-1](https://doi.org/10.1016/S0002-7138(09)61391-1)
- Ramchandani, P., & Stein, A. (2003). The impact of parental psychiatric disorder on children. In *British Medical Journal* (Vol. 327, Issue 7409, pp. 242–243). BMJ Publishing Group. <https://doi.org/10.1136/bmj.327.7409.242>
- Rholes, W. S., Simpson, J. A., & Grich Stevens, J. (1998). Attachment orientations, social support, and conflict resolution in close relationships. - PsycNET. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 166–188). The Guilford Press. <https://psycnet.apa.org/record/1997-36873-006>

- Riordan, D., Appleby, L., & Faragher, B. (1999). Mother–infant interaction in post-partum women with schizophrenia and affective disorders. *Psychological Medicine*, 29(4), 991–995. <https://doi.org/10.1017/S0033291798007727>
- Rodning, C., Beckwith, L., & Howard, J. (1991). Quality of attachment and home environments in children prenatally exposed to PCP and cocaine. *Development and Psychopathology*, 3(4), 351–366. <https://doi.org/10.1017/S0954579400007562>
- Rogosch, F. A., Mowbray, C. T., & Bogat, G. A. (1992). Determinants of parenting attitudes in mothers with severe psychopathology. *Development and Psychopathology*, 4(3), 469–487. <https://doi.org/10.1017/S0954579400000900>
- Romm, K. L., Rossberg, J. I., Berg, A. O., Barrett, E. A., Faerden, A., Agartz, I., Andreassen, O. A., & Melle, I. (2010). Depression and depressive symptoms in first episode psychosis. *Journal of Nervous and Mental Disease*, 198(1), 67–71. <https://doi.org/10.1097/NMD.0B013E3181C81FC0>
- Rubin, K. H., Burgess, K. B., Dwyer, K. M., & Hastings, P. D. (2003). Predicting Preschoolers' Externalizing Behaviors from Toddler Temperament, Conflict, and Maternal Negativity. *Developmental Psychology*, 39(1), 164–176. <https://doi.org/10.1037/0012-1649.39.1.164>
- Rudovic, O., Lee, J., Dai, M., Schuller, B., & Picard, R. W. (2018). Personalized machine learning for robot perception of affect and engagement in autism therapy. *Science Robotics*, 3(19), eaao6760. <https://doi.org/10.1126/scirobotics.aao6760>
- Rutherford, H. J. V., & Mayes, L. C. (2017). Parenting and addiction: neurobiological insights. *Current Opinion in Psychology*, 15, 55–60. <https://doi.org/10.1016/j.copsyc.2017.02.014>
- Rutherford, H. J. V., & Mayes, L. C. (2019). Parenting stress: A novel mechanism of addiction vulnerability. *Neurobiology of Stress*, 11, 100172. <https://doi.org/10.1016/J.YNSTR.2019.100172>
- Rutherford, H. J. V., Williams, S. K., Moy, S., Mayes, L. C., & Johns, J. M. (2011). Disruption of Maternal Parenting Circuitry by Addictive Process: Rewiring of Reward and Stress Systems. *Frontiers in Psychiatry*, 2. <https://doi.org/10.3389/fpsy.2011.00037>
- Rutherford, H. J. V., Kim, S., Yip, S. W., Potenza, M. N., Mayes, L. C., & Strathearn, L. (2021). Parenting and Addictions: Current Insights From Human Neuroscience. *Current Addiction Reports*, 8, 380–388. <https://doi.org/10.1007/s40429-021-00384-6/Published>
- Sagi, A., Koren-Karie, N., Gini, M., Ziv, Y., & Joels, T. (2002). Shedding further light on the effects of various types and quality of early child care on infant-mother attachment relationship: The Haifa Study of Early Child Care. *Child Development*. <https://doi.org/10.1111/1467-8624.00465>
- Salloum, I. M., & Brown, E. S. (2017). Management of comorbid bipolar disorder and substance use disorders. *The American Journal of Drug and Alcohol Abuse*, 43(4), 366–376. <https://doi.org/10.1080/00952990.2017.1292279>
- Salo, S., Kivistö, K., Korja, R., Biringen, Z., Tupola, S., Kahila, H., & Kivitie-Kallio, S. (2009). Emotional availability, parental self-efficacy beliefs, and child development in caregiver-child relationships with buprenorphine-exposed 3-year-olds. *Parenting*. <https://doi.org/10.1080/15295190902844563>
- Salo, S., Politi, J., Tupola, S., Biringen, Z., Kalland, M., Halmesmäki, E., Kahila, H., & Kivitie-Kallio, S. (2010). Early development of opioid-exposed infants born to mothers in buprenorphine-replacement therapy. *Journal of Reproductive and Infant Psychology*, 28(2), 161–179. <https://doi.org/10.1080/02646830903219109>
- Sameroff, A., & Haith, M. (1996). Interpreting Developmental Transitions. *The Five to Seven Year Shift: The Age of Reason AndResponsibility*.
- Sameroff, A. (1975). Transactional models in early social relations. *Human Development*. <https://doi.org/10.1159/000271476>

- Sarno, I., Preti, E., Prunas, A., & Madeddu, F. (2011). *SCL-90-R Symptom Checklist-90-R Adattamento italiano*. Giunti, Organizzazioni Speciali.
- Saunders, H., Biringen, Z., Benton, J., Closson, L., Herndon, E., & Prosser, J. L. (2017). Emotional Availability and Emotional Availability Zones (EA-Z): From assessment to intervention and universal prevention. *Perspectives in Infant Mental Health*, 1–16.
- Saunders, H., Kraus, A., Barone, L., & Biringen, Z. (2015). Emotional availability: theory, research, and intervention. *Frontiers in Psychology*, 6. <https://doi.org/10.3389/fpsyg.2015.01069>
- Scaramella, L. V., & Conger, R. D. (2003). Intergenerational Continuity of Hostile Parenting and its Consequences: The Moderating Influence of Children's Negative Emotional Reactivity. *Social Development*, 12(3), 420–439. <https://doi.org/10.1111/1467-9507.00241>
- Scaramella, L. V., Conger, R. D., Spoth, R., & Simons, R. L. (2002). Evaluation of a Social Contextual Model of Delinquency: A Cross-Study Replication. *Child Development*, 73(1), 175–195. <https://doi.org/10.1111/1467-8624.00399>
- Scarr, S., & McCartney, K. (1983). How People Make Their Own Environments: A Theory of Genotype --> Environment Effects. *Child Development*, 54(2), 424. <https://doi.org/10.2307/1129703>
- Schaal, B., Marlier, L., & Soussignan, R. (1998). Olfactory function in the human fetus: evidence from selective neonatal responsiveness to the odor of amniotic fluid. *Behavioral Neuroscience*, 112(6), 1438.
- Schaal, Benoist, Marlier, L., & Soussignan, R. (1998). Olfactory function in the human fetus: Evidence from selective neonatal responsiveness to the odor of amniotic fluid. *Behavioral Neuroscience*, 112(6), 1438–1449. <https://doi.org/10.1037/0735-7044.112.6.1438>
- Schechter, D. S., Suardi, F., Manini, A., Cordero, M. I., Rossignol, A. S., Merminod, G., Gex-Fabry, M., Moser, D. A., & Serpa, S. R. (2015). How do Maternal PTSD and Alexithymia Interact to Impact Maternal Behavior? *Child Psychiatry & Human Development*, 46(3), 406–417. <https://doi.org/10.1007/s10578-014-0480-4>
- Scherbaum, N., & Specka, M. (2008). Factors influencing the course of opiate addiction. In *International Journal of Methods in Psychiatric Research*. <https://doi.org/10.1002/mpr.244>
- Schiepek, G., Eckert, H., & Weihrauch, S. (2003). Critical Fluctuations and Clinical Change: Data-Based Assessment in Dynamic Systems. *Constructivism in the Human Science*, 8(1), 57–84. <https://www.proquest.com/openview/c1807a4fefe21c19ecc831d23ea51124/1?pq-origsite=gscholar&cbl=29080>
- Schlosser, D. A., Zinberg, J. L., Loewy, R. L., Casey-Cannon, S., O'Brien, M. P., Bearden, C. E., Vinogradov, S., & Cannon, T. D. (2010). Predicting the longitudinal effects of the family environment on prodromal symptoms and functioning in patients at-risk for psychosis. *Schizophrenia Research*, 118(1–3), 69–75. <https://doi.org/10.1016/J.SCHRES.2010.01.017>
- Schmidt, T. P., Pennington, D. L., Cardoos, S. L., Durazzo, T. C., & Meyerhoff, D. J. (2017). Neurocognition and inhibitory control in polysubstance use disorders: Comparison with alcohol use disorders and changes with abstinence. *Journal of Clinical and Experimental Neuropsychology*, 39(1), 22–34. <https://doi.org/10.1080/13803395.2016.1196165>
- Schubert, E. W., Blennow, G., & McNeil, T. F. (1996). Wakefulness and arousal in neonates born to women with schizophrenia: diminished arousal and its association with neurological deviations. *Schizophrenia Research*, 22(1), 49–59. [https://doi.org/10.1016/0920-9964\(96\)00053-9](https://doi.org/10.1016/0920-9964(96)00053-9)
- Seifer, R., Schiller, M., Sameroff, A. J., Resnick, S., & Riordan, K. (1996). Attachment, maternal sensitivity, and infant temperament during the first year of life. *Developmental Psychology*, 32(1), 12–25. <https://doi.org/10.1037/0012-1649.32.1.12>
- Shaffer, A., & Obradović, J. (2017). Unique contributions of emotion regulation and executive functions in predicting the quality of parent-child interaction behaviors. *Journal of Family Psychology*, 31(2), 150–

159. <https://doi.org/10.1037/fam0000269>

- Shallice, T. (1982). Specific impairments of planning. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*. <https://doi.org/10.1098/rstb.1982.0082>
- Sharp, C., & Fonagy, P. (2008). The Parent's Capacity to Treat the Child as a Psychological Agent: Constructs, Measures and Implications for Developmental Psychopathology. *Social Development, 17*(3), 737–754. <https://doi.org/10.1111/J.1467-9507.2007.00457.X>
- Shay, N. L., & Knutson, J. F. (2008). Maternal depression and trait anger as risk factors for escalated physical discipline. *Child Maltreatment, 13*(1), 39–49. <https://doi.org/10.1177/1077559507310611>
- Sibbald, B., & Roland, M. (1998). Understanding controlled trials. Why are randomised controlled trials important? *BMJ: British Medical Journal, 316*(7126), 201. <https://doi.org/10.1136/BMJ.316.7126.201>
- Sifneos, P. E. (1973). The Prevalence of 'Alexithymic' Characteristics in Psychosomatic Patients. *Psychotherapy and Psychosomatics, 22*(2–6), 255–262. <https://doi.org/10.1159/000286529>
- Silverton, L. (1988). Crime and the schizophrenia spectrum: a diathesis-stress model. *Acta Psychiatrica Scandinavica, 78*(1), 72–81. <https://doi.org/10.1111/J.1600-0447.1988.TB06303.X>
- Simmons, L. A., Havens, J. R., Whiting, J. B., Holz, J. L., & Bada, H. (2009). Illicit Drug Use Among Women with Children in the United States: 2002–2003. *Annals of Epidemiology, 19*(3), 187–193. <https://doi.org/10.1016/J.ANNEPIDEM.2008.12.007>
- Simonelli, A. (2014). *La funzione genitoriale*. Cortina.
- Simonelli, A., Porreca, A., De Palo, F., & Capra, N. (2014). Maternal psychosis and disfunctions in early interactions: clinical considerations on the case of a mother with schizophrenia and her daughter. *Advanced Research in Scientific Areas, 194–199*. <https://www.researchgate.net/publication/270567619>
- Simpson, T. L., & Miller, W. R. (2002). Concomitance between childhood sexual and physical abuse and substance use problems: A review. *Clinical Psychology Review, 22*(1), 27–77. [https://doi.org/10.1016/S0272-7358\(00\)00088-X](https://doi.org/10.1016/S0272-7358(00)00088-X)
- Skagerlind, L., Perris, C., & Eisemann, M. (1996). Perceived parental rearing behaviour in patients with a schizophrenic disorder and its relationship to aspects of the course of the illness. *Acta Psychiatrica Scandinavica, 93*(5), 403–406. <https://doi.org/10.1111/J.1600-0447.1996.TB10667.X>
- Slade, A. (2005). Parental reflective functioning: An introduction. In *Attachment and Human Development* (Vol. 7, Issue 3, pp. 269–281). Routledge. <https://doi.org/10.1080/14616730500245906>
- Slotkin, T. A. (1998). Fetal nicotine or cocaine exposure: which one is worse? *The Journal of Pharmacology and Experimental Therapeutics, 285*(3), 666–669. <https://doi.org/10.1056/nejm198509123131105>
- Smaling, H. J. A., Huijbregts, S. C. J., Surland, J., van der Heijden, K. B., Mesman, J., van Goozen, S. H. M., & Swaab, H. (2016). Prenatal Reflective Functioning and Accumulated Risk as Predictors of Maternal Interactive Behavior During Free Play, the Still-Face Paradigm, and Two Teaching Tasks. *Infancy, 21*(6), 766–784. <https://doi.org/10.1111/INFA.12137>
- Smith, J. C., Cumming, A., & Xeros-Constantinides, S. (2010). A decade of parent and infant relationship support group therapy programs. *International Journal of Group Psychotherapy, 60*(1). <https://doi.org/10.1521/IJGP.2010.60.1.59>
- Smith, J. D., Dishion, T. J., Shaw, D. S., Wilson, M. N., Winter, C. C., & Patterson, G. R. (2014). Coercive family process and early-onset conduct problems from age 2 to school entry. *Development and Psychopathology*. <https://doi.org/10.1017/S0954579414000169>
- Smith, V. C., Wilson, C. R., & PREVENTION, C. O. S. U. A. (2016). Families Affected by Parental Substance Use. *Pediatrics, 138*(2). <https://doi.org/10.1542/PEDS.2016-1575>
- Snellen, M., Mack, K., & Trauer, T. (1999). Schizophrenia, Mental State, and Mother—Infant Interaction:

Examining the Relationship: *Australian and New Zealand Journal of Psychiatry*, 33(6), 902–911. <https://doi.org/10.1046/J.1440-1614.1999.00641.X>

- Soenens, B., & Vansteenkiste, M. (2010). A theoretical upgrade of the concept of parental psychological control: Proposing new insights on the basis of self-determination theory. *Developmental Review*, 30(1), 74–99. <https://doi.org/10.1016/j.dr.2009.11.001>
- Song, M. K., Lin, F. C., Ward, S. E., & Fine, J. P. (2013). Composite variables: When and how. *Nursing Research*, 62(1), 45–49. <https://doi.org/10.1097/NNR.0b013e3182741948>
- Sonnby-Borgström, M. (2009). Alexithymia as Related to Facial Imitation, Mentalization, Empathy, and Internal Working Models-of-Self and -Others. *Neuropsychoanalysis*. <https://doi.org/10.1080/15294145.2009.10773602>
- Sorce, J. F., & Emde, R. N. (1981). Mother's presence is not enough: Effect of emotional availability on infant exploration. *Developmental Psychology*. <https://doi.org/10.1037/0012-1649.17.6.737>
- Spehr, M. K., Coddington, J., Ahmed, A. H., & Jones, E. (2017). Parental Opioid Abuse: Barriers to Care, Policy, and Implications for Primary Care Pediatric Providers. *Journal of Pediatric Health Care*, 31(6), 695–702. <https://doi.org/10.1016/J.PEDHC.2017.05.007>
- Speranza, M., Corcos, M., Stéphan, P., Loas, G., Pérez-Diaz, F., Lang, F., Venisse, J. L., Bizouard, P., Flament, M., Halfon, O., & Jeammet, P. (2004). Alexithymia, Depressive Experiences, and Dependency in Addictive Disorders. *Substance Use & Misuse*, 39(4), 551–579. <https://doi.org/10.1081/JA-120030058>
- St. John, A. M., Kibbe, M., & Tarullo, A. R. (2019). A systematic assessment of socioeconomic status and executive functioning in early childhood. *Journal of Experimental Child Psychology*, 178, 352–368. <https://doi.org/10.1016/J.JECP.2018.09.003>
- Stabenau, J. R., & Pollin, W. (1993). Heredity and environment in schizophrenia, revisited: The contribution of twin and high-risk studies. *Journal of Nervous and Mental Disease*, 181(5), 291–297. <https://doi.org/10.1097/00005053-199305000-00003>
- Stacks, A. M., Muzik, M., Wong, K., Beeghly, M., Huth-Bocks, A., Irwin, J. L., & Rosenblum, K. L. (2014). Maternal reflective functioning among mothers with childhood maltreatment histories: links to sensitive parenting and infant attachment security. *Attachment & Human Development*, 16(5), 515–533. <https://doi.org/10.1080/14616734.2014.935452>
- Stein, A., Malmberg, L.-E., Sylva, K., Barnes, J., & Leach, P. (2008). The influence of maternal depression, caregiving, and socioeconomic status in the post-natal year on children's language development. *Child: Care, Health and Development*, 34(5), 603–612. <https://doi.org/10.1111/J.1365-2214.2008.00837.X>
- Stein, A. (2012). Maternal cognitions and mother–infant interaction in postnatal depression and generalized anxiety disorder. *Journal of Abnormal Psychology*, 121(4), 795. <https://doi.org/10.1037/A0026847>
- Stein, A., & Harold, G. (2015). Impact of parental psychiatric disorder and physical illness. In A. Thapar, D. S. Pine, J. F. Leckman, S. Scott, M. J. Snowling, & E. Taylor (Eds.), *Rutter's Child and Adolescent Psychiatry*.
- Stein, A., Ramchandani, P., & Murray, L. (2009). Impact of Parental Psychiatric Disorder and Physical Illness. In *Rutter's Child and Adolescent Psychiatry: Fifth Edition* (pp. 407–420). Blackwell Publishing Ltd. <https://doi.org/10.1002/9781444300895.ch27>
- Stevenson-Hinde, J., Chicot, R., Shouldice, A., & Hinde, C. A. (2013). Maternal anxiety, maternal sensitivity, and attachment. *Attachment & Human Development*, 15(5–6), 618–636. <https://doi.org/10.1080/14616734.2013.830387>
- Stocco, S., Simonelli, A., Capra, N., & De Palo, F. (2012). Research and intervention for drug-addicted mothers and their children: New Perspectives. In *Addictions - From Pathophysiology to Treatment*. InTech.

- Stordal, K. I., Mykletun, A., Asbjørnsen, A., Egeland, J., Landrø, N. I., Roness, A., Rund, B. R., Sundet, K. S., Lundervold, A. J., & Lund, A. (2005). General psychopathology is more important for executive functioning than diagnosis. *Acta Psychiatrica Scandinavica*, *111*(1), 22–28. <https://doi.org/10.1111/J.1600-0447.2004.00389.X>
- Stover, C. S., Hall, C., McMahon, T. J., & Easton, C. J. (2012). Fathers entering substance abuse treatment: An examination of substance abuse, trauma symptoms and parenting behaviors. *Journal of Substance Abuse Treatment*. <https://doi.org/10.1016/j.jsat.2011.12.012>
- Strantz, I. H., & Welch, S. P. (2012). Postpartum Women in Outpatient Drug Abuse Treatment: Correlates of Retention/Completion. *Journal of Psychoactive Drugs*, *27*(4), 357–373. <https://doi.org/10.1080/02791072.1995.10471701>
- Strathearn, L., & Mayes, L. C. (2010). Cocaine addiction in mothers: Potential effects on maternal care and infant development. In *Annals of the New York Academy of Sciences*. <https://doi.org/10.1111/j.1749-6632.2009.05142.x>
- Suchman, N., DeCoste, C., Castiglioni, N., Legow, N., & Mayes, L. (2008). The Mothers and Toddlers Program: Preliminary Findings From an Attachment-Based Parenting Intervention for Substance-Abusing Mothers. *Psychoanalytic Psychology*. <https://doi.org/10.1037/0736-9735.25.3.499>
- Suchman, N. E., DeCoste, C., Castiglioni, N., McMahon, T. J., Rounsaville, B., & Mayes, L. (2010). The Mothers and Toddlers Program, an attachment-based parenting intervention for substance using women: Post-treatment results from a randomized clinical pilot. *Attachment & Human Development*, *12*(5), 483–504. <https://doi.org/10.1080/14616734.2010.501983>
- Suchman, N. E., DeCoste, C., Leigh, D., & Borelli, J. (2010). Reflective functioning in mothers with drug use disorders: Implications for dyadic interactions with infants and toddlers. *Attachment and Human Development*. <https://doi.org/10.1080/14616734.2010.501988>
- Suchman, N. E., Decoste, C., McMahon, T. J., Rounsaville, B., & Mayes, L. (2011). The Mothers and Toddlers program, an attachment-based parenting intervention for substance-using women: Results at 6-week follow-up in a randomized clinical pilot. *Infant Mental Health Journal*. <https://doi.org/10.1002/imhj.20303>
- Suchman, N. E., Decoste, C., Rosenberger, P., & McMahon, T. J. (2012). Attachment-based intervention for substance-using mothers: A preliminary test of the proposed mechanisms of change. *Infant Mental Health Journal*. <https://doi.org/10.1002/imhj.21311>
- Suchman, N. E., & Luthar, S. S. (2000). Maternal addiction, child maladjustment and socio-demographic risks: Implications for parenting behaviors. *Addiction*. <https://doi.org/10.1046/j.1360-0443.2000.959141711.x>
- Suchman, N. E., & Luthar, S. S. (2001). The Mediating Role of Parenting Stress in Methadone-Maintained Mothers' Parenting. *Parenting*. https://doi.org/10.1207/S15327922PAR0104_2
- Suchman, N., Mayes, L., Conti, J., Slade, A., & Rounsaville, B. (2004). Rethinking parenting interventions for drug-dependent mothers: From behavior management to fostering emotional bonds. *Journal of Substance Abuse Treatment*. <https://doi.org/10.1016/j.jsat.2004.06.008>
- Suchman, N., Pajulo, M., DeCoste, C., & Mayes, L. (2006). Parenting Interventions for Drug-Dependent Mothers and Their Young Children: The Case for an Attachment-Based Approach*. *Family Relations*, *55*(2), 211–226. <https://doi.org/10.1111/j.1741-3729.2006.00371.x>
- Sullivan, J. W., & Horowitz, F. D. (1983). Infant intermodal perception and maternal multimodal stimulation: Implications for language development. *Advances in Infancy Research*.
- Swain, J. E. (2011b). The human parental brain: In vivo neuroimaging. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *35*(5), 1242–1254. <https://doi.org/10.1016/J.PNPBP.2010.10.017>

- Swain, J. E., & Ho, S. H. S. (2017). Neuroendocrine mechanisms for parental sensitivity: overview, recent advances and future directions. In *Current Opinion in Psychology*. <https://doi.org/10.1016/j.copsy.2017.02.027>
- Swain, J. E., Mayes, L. C., & Leckman, J. F. (2004). The development of parent-infant attachment through dynamic and interactive signaling loops of care and cry. *Behavioral and Brain Sciences*, 27(4), 472–473. <https://doi.org/10.1017/S0140525X0437010X>
- Swanson, K., Beckwith, L., & Howard, J. (2000). Intrusive caregiving and quality of attachment in prenatally drug- exposed toddlers and their primary caregivers. *Attachment & Human Development*, 2(2), 130–148. <https://doi.org/10.1080/14616730050085527>
- Swendsen, J. (2000). The comorbidity of depression and substance use disorders. *Clinical Psychology Review*, 20(2), 173–189. [https://doi.org/10.1016/S0272-7358\(99\)00026-4](https://doi.org/10.1016/S0272-7358(99)00026-4)
- Szeliski, R. (2011). *Computer Vision. Algorithms and Applications*. Springer-Verlag.
- Tarter, R. E., Blackson, T., Martin, C., Loeber, R., & Moss, H. B. (1993). Characteristics and Correlates of Child Discipline Practices in Substance Abuse and Normal Families. *American Journal on Addictions*, 2(1), 18–25. <https://doi.org/10.3109/10550499309115938>
- Taylor, G. J., & Bagby, R. M. (2000). An overview of the alexithymia construct. In R. Bar-On & D. A. J. Parker (Ed.), *The handbook of emotional intelligence: Theory, development, assessment, and application at home, school, and in the workplace* (pp. 40–67). Jossey-Bass.
- Taylor, G. J., & Bagby, R. M. (2004). New Trends in Alexithymia Research. *Psychotherapy and Psychosomatics*, 73(2), 68–77. <https://doi.org/10.1159/000075537>
- Taylor, Graeme J., Bagby, R. M., Parker, J. D. A., & Grotstein, J. (1997). *Disorders of affect regulation*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511526831>
- Tedgård, E., Råstam, M., & Wirtberg, I. (2019). An upbringing with substance-abusing parents: Experiences of parentification and dysfunctional communication. *NAD Nordic Studies on Alcohol and Drugs*. <https://doi.org/10.1177/1455072518814308>
- Teichner, G., Horner, M. D., Roitzsch, J. C., Herron, J., & Thevos, A. (2002). Substance abuse treatment outcomes for cognitively impaired and intact outpatients. *Addictive Behaviors*. [https://doi.org/10.1016/S0306-4603\(01\)00207-6](https://doi.org/10.1016/S0306-4603(01)00207-6)
- Thompson-Booth, C., Viding, E., Mayes, L. C., Rutherford, H. J. V., Hodsoll, S., & Mccrory, E. J. (2014). Here's looking at you, kid: Attention to infant emotional faces in mothers and non-mothers. *Developmental Science*. <https://doi.org/10.1111/desc.12090>
- Thompson, B. L., Levitt, P., & Stanwood, G. D. (2009). Prenatal exposure to drugs: effects on brain development and implications for policy and education. *Nature Reviews Neuroscience* 2009 10:4, 10(4), 303–312. <https://doi.org/10.1038/nrn2598>
- Thompson Gershoff, E. (2000). Corporal Punishment by Parents and Associated Child Behaviors and Experiences: A Meta-Analytic and Theoretical Review. *Glueck & Glueck*. <https://doi.org/10.1037/0033-2909.128.4.539>
- Thompson, J. (2012). *Alexithymic parents: The impacts on children*. Soul Books.
- Thorberg, F. A., Young, R. M., Sullivan, K. A., & Lyvers, M. (2009). Alexithymia and alcohol use disorders: A critical review. *Addictive Behaviors*, 34(3), 237–245. <https://doi.org/10.1016/j.addbeh.2008.10.016>
- Tiberio, S. S., Kerr, D. C. R., Bailey, J. A., Henry, K. L., & Capaldi, D. M. (2020). Intergenerational associations in onset of cannabis use during adolescence: A data synthesis approach. *Psychology of Addictive Behaviors*, 34(8), 877–889. <https://doi.org/10.1037/ADB0000625>
- Torrado, M. V., Ouakinin, S. S., & Bacelar-Nicolau, L. (2013). Alexithymia, Emotional Awareness and

Perceived Dysfunctional Parental Behaviors in Heroin Dependents. *International Journal of Mental Health and Addiction*, 11(6), 703–718. <https://doi.org/10.1007/s11469-013-9448-z>

- Townshend, J. M., & Duka, T. (2001). Attentional bias associated with alcohol cues: Differences between heavy and occasional social drinkers. *Psychopharmacology*. <https://doi.org/10.1007/s002130100764>
- Trapolini, T., Ungerer, J. A., & McMahon, C. A. (2008). Maternal depression: relations with maternal caregiving representations and emotional availability during the preschool years. *Attachment & Human Development*, 10(1), 73–90. <https://doi.org/10.1080/14616730801900712>
- Trevarthen, C. (2017). The function of emotions in early infant communication and development. In J. Nadel & L. Camaioni (Eds.), *New Perspectives in Early Communicative Development* (1 edition, pp. 48–81). Routledge. <https://doi.org/10.4324/9781315111322-5>
- Tronick, E. Z., Messinger, D. S., Weinberg, M. K., Lester, B. M., LaGasse, L., Seifer, R., Bauer, C. R., Shankaran, S., Bada, H., Wright, L. L., Poole, K., & Liu, J. (2005). Cocaine Exposure Is Associated With Subtle Compromises of Infants' and Mothers' Social-Emotional Behavior and Dyadic Features of Their Interaction in the Face-to-Face Still-Face Paradigm. *Developmental Psychology*, 41(5), 711–722. <https://doi.org/10.1037/0012-1649.41.5.711>
- Tronick, Edward Z. (1989). Emotions and Emotional Communication in Infants. *American Psychologist*, 44(2), 112–119. <https://doi.org/10.1037/0003-066X.44.2.112>
- Trupe, R. D., Macfie, J., Skadberg, R. M., & Kurdziel, G. (2018). Patterns of emotional availability between mothers and young children: Associations with risk factors for borderline personality disorder. *Infant and Child Development*, 27(1), e2046. <https://doi.org/10.1002/ICD.2046>
- Turner, S. M., Beidel, D. C., & Costello, A. (1987). Psychopathology in the Offspring of Anxiety Disorders Patients. *Journal of Consulting and Clinical Psychology*, 55(2), 229–235. <https://doi.org/10.1037/0022-006X.55.2.229>
- Tuulio-Henriksson, A., Perälä, J., Saarni, S. I., Isometsä, E., Koskinen, S., Lönnqvist, J., & Suvisaari, J. (2011). Cognitive functioning in severe psychiatric disorders: a general population study. *European Archives of Psychiatry and Clinical Neuroscience* 2011 261:6, 261(6), 447–456. <https://doi.org/10.1007/S00406-010-0186-Y>
- van Den Bergh, B. R. H., Mulder, E. J. H., Mennes, M., & Glover, V. (2005). Antenatal maternal anxiety and stress and the neurobehavioural development of the fetus and child: links and possible mechanisms. A review. *Neuroscience & Biobehavioral Reviews*, 29(2), 237–258. <https://doi.org/10.1016/J.NEUBIOREV.2004.10.007>
- van Der Voort, A., Juffer, F., & Bakermans-Kranenburg, M. J. (2014). Sensitive parenting is the foundation for secure attachment relationships and positive social-emotional development of children. *Journal of Children's Services*, 9(2), 165–176. <https://doi.org/10.1108/JCS-12-2013-0038>
- van IJzendoorn, M. H. van, Bard, K. A., Bakermans-Kranenburg, M. J., & Ivan, K. (2009). Enhancement of attachment and cognitive development of young nursery-reared chimpanzees in responsive versus standard care. *Developmental Psychobiology*, 51(2), 173–185. <https://doi.org/10.1002/DEV.20356>
- van Zeijl, J., Mesman, J., van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., Juffer, F., Stolk, M. N., Koot, H. M., & Alink, L. R. A. (2006). Attachment-based intervention for enhancing sensitive discipline in mothers of 1- to 3-year-old children at risk for externalizing behavior problems: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 74(6), 994–1005. <https://doi.org/10.1037/0022-006X.74.6.994>
- Vanheule, S., Desmet, M., Meganck, R., & Bogaerts, S. (2007). Alexithymia and interpersonal problems. *Journal of Clinical Psychology*, 63(1), 109–117. <https://doi.org/10.1002/jclp.20324>
- Venuti, P., de Falco, S., Giusti, Z., & Bornstein, M. H. (2008). Play and emotional availability in young children with Down syndrome. *Infant Mental Health Journal*, 29(2), 133–152. <https://doi.org/10.1002/IMHJ.20168>

- Verdejo-García, A., & Pérez-García, M. (2007). Profile of executive deficits in cocaine and heroin polysubstance users: Common and differential effects on separate executive components. *Psychopharmacology*. <https://doi.org/10.1007/s00213-006-0632-8>
- Wagenmakers, E.-J., & Farrell, S. (2004). AIC model selection using Akaike weights. *Psychonomic Bulletin & Review*, *11*(1), 192–196. <https://doi.org/10.3758/BF03206482>
- Webb, R., & Ayers, S. (2015). Cognitive biases in processing infant emotion by women with depression, anxiety and post-traumatic stress disorder in pregnancy or after birth: A systematic review. *Cognition and Emotion*, *29*(7), 1278–1294. <https://doi.org/10.1080/02699931.2014.977849>
- Welsh, C., H.L., M., & E., J. (2003). The relationship between parental substance abuse and child maltreatment: Findings from the Ontario Health Supplement. *Child Abuse and Neglect*.
- Weinfield, N. S., Sroufe, L. A., Byron, B., & Carlson, E. (2008). Individual Differences in Infant– Caregiver Attachment: Conceptual and Empirical Aspects of Security. In *Handbook of Attachment*.
- Weinstock, M. (2001). Alterations induced by gestational stress in brain morphology and behaviour of the offspring. *Progress in Neurobiology*, *65*(5), 427–451. [https://doi.org/10.1016/S0301-0082\(01\)00018-1](https://doi.org/10.1016/S0301-0082(01)00018-1)
- Weinstock, M. (2008). The long-term behavioural consequences of prenatal stress. *Neuroscience & Biobehavioral Reviews*, *32*(6), 1073–1086. <https://doi.org/10.1016/J.NEUBIOREV.2008.03.002>
- Weissman, M. M., Paykel, E. S., & Klerman, G. L. (1972). The depressed woman as a mother. *Social Psychiatry 1972 7:2*, *7*(2), 98–108. <https://doi.org/10.1007/BF00583985>
- Weissman, M. M., Pilowsky, D. J., Wickramaratne, P. J., Talati, A., Wisniewski, S. R., Fava, M., Hughes, C. W., Garber, J., Malloy, E., King, C. A., Cerda, G., Sood, A. B., Alpert, J. E., Trivedi, M. H., Rush, A. J., & Team, for the S.-C. (2006). Remissions in Maternal Depression and Child Psychopathology: A STAR*D-Child Report. *JAMA*, *295*(12), 1389–1398. <https://doi.org/10.1001/JAMA.295.12.1389>
- Werner, C. D., Vermeer, H. J., Linting, M., & Van IJzendoorn, M. H. (2018). Video-feedback intervention in center-based child care: A randomized controlled trial. *Early Childhood Research Quarterly*, *42*, 93–104. <https://doi.org/10.1016/j.ecresq.2017.07.005>
- Whaley, S. E., Pinto, A., & Sigman, M. (1999). Characterizing interactions between anxious mothers and their children. *Journal of Consulting and Clinical Psychology*, *67*(6), 826–836. <https://doi.org/10.1037/0022-006X.67.6.826>
- Williams, M. T., & Roberts, C. S. (2009). Predicting Length of Stay in Long-Term Treatment for Chemically Dependent Females. *International Journal of the Addictions*, *26*(5), 605–613. <https://doi.org/10.3109/10826089109058908>
- Windham, A. M., Rosenberg, L., Fuddy, L., McFarlane, E., Sia, C., & Duggan, A. K. (2004). Risk of mother-reported child abuse in the first 3 years of life. *Child Abuse & Neglect*, *28*(6), 645–667. <https://doi.org/10.1016/J.CHIABU.2004.01.003>
- Windhorst, D. A., Mileva-Seitz, V. R., Linting, M., Hofman, A., Jaddoe, V. W. V., Verhulst, F. C., Tiemeier, H., van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2015). Differential susceptibility in a developmental perspective: DRD4 and maternal sensitivity predicting externalizing behavior. *Developmental Psychobiology*, *57*(1), 35–49. <https://doi.org/10.1002/DEV.21257>
- Yilmaz, O., & Dilbaz, N. (2016). Complex Comorbidity of Substance Use Disorders with Anxiety Disorders: Diagnosis and Treatment. In *New Developments in Anxiety Disorders*. InTech. <https://doi.org/10.5772/66247>
- Yoshida, K., Marks, M. N., Craggs, M., Smith, B., & Kumar, R. (1999). Sensorimotor and cognitive development of infants of mothers with schizophrenia. *The British Journal of Psychiatry*, *175*(4), 380–387. <https://doi.org/10.1192/BJP.175.4.380>
- Yürümez, E., Akça, Ö. F., Uğur, Ç., Uslu, R. I., & Kılıç, B. G. (2014). Mothers' alexithymia, depression and

anxiety levels and their association with the quality of mother-infant relationship: A preliminary study. *International Journal of Psychiatry in Clinical Practice*, 18(3), 190–196.
<https://doi.org/10.3109/13651501.2014.940055>

Zahn-Waxler, C., Duggal, S., & Gruber, R. (2002). Parental psychopathology. . In M.H. Bornstein (Ed.), *Handbook of parenting: social conditions and applied parenting* (pp. 295–327). Lawrence Erlbaum Associates Publishers. <https://psycnet.apa.org/record/2002-02522-012>

Zavos, H. M. S., Freeman, D., Haworth, C. M. A., McGuire, P., Plomin, R., Cardno, A. G., & Ronald, A. (2014). Consistent Etiology of Severe, Frequent Psychotic Experiences and Milder, Less Frequent Manifestations: A Twin Study of Specific Psychotic Experiences in Adolescence. *JAMA Psychiatry*, 71(9), 1049–1057. <https://doi.org/10.1001/JAMAPSYCHIATRY.2014.994>

Ziv, Y., Aviezer, O., Gini, M., Sagi, A., & Koren-Karie, N. (2000). Emotional availability in the mother-infant dyad as related to the quality of infant-mother attachment relationship. *Attachment and Human Development*. <https://doi.org/10.1080/14616730050085536>

Zuckerman, B., & Brown, E. . (1993). Maternal substance abuse and infant development. In C. H. Zeanah (Ed.), *Handbook of Infant Mental Health* (pp. 143–158). Guilford Press.

Zweben, J. E., Clark, H. W., & Smith, D. E. (2012). Traumatic Experiences and Substance Abuse: Mapping the Territory. *Journal of Psychoactive Drugs*, 26(4), 327–344.
<https://doi.org/10.1080/02791072.1994.10472453>

Appendix

Table 1a. Means, standard deviations, and correlations.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Child's Age	19.37	23.62							
2. Mother's Age	29.20	7.47	.39**						
3. Sensitivity	4.04	0.73	.08	-.18					
4. Nonhostility	5.20	1.07	-.20	.04	.45**				
5. Structuring	4.28	0.69	-.14	-.19	.67**	.34**			
6. Nonintrusiveness	4.03	1.27	.44**	.37**	.48**	.36**	.19		
7. Depression	55.95	13.06	.06	.25 [†]	-.30*	-.17	-.14	-.06	
8. Alexithymia	48.65	11.03	-.02	-.08	-.17	-.11	-.22 [†]	-.13	.27*

[†] $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$;

Table 2a. Effects of anxious symptomatology in the association between Alexithymia and EAS variables.

	Emotional Availability Scales - Mother							
	Sensitivity		Structuring		Nonintrusiveness		Nonhostility	
	beta	omega	beta	omega	beta	omega	beta	omega
Alexithymia	-0.2	0.03	-0.35**	0.07	-0.07	0	-0.16	0.02
SCL - Anxiety	-0.13	0.02	0.15	-0.01	-0.14	-0.01	-0.1	-0.01
Child's Age	0.17	-0.01	-0.07	0.01	0.34*	0.17	-0.26+	0.02
Mother's Age	-0.23	0.02	-0.24+	0.03	0.28*	0.04	0.16	0
	0.127		0.159*		0.258**		0.101	
	132.563		125.516		188.077		181.165	
	$F(1,54) = 0.81, p = .37$		$F(1,54) = 1.17, p = .29$		$F(1,54) = 1.09, p = .3$		$F(1,54) = 0.44, p = .51$	

Table 3a. Effects of global psychopathology in the association between Alexithymia and EAS variables.

	Emotional Availability Scales - Mother							
	Sensitivity		Structuring		Nonintrusiveness		Nonhostility	
	beta	omega	beta	omega	beta	omega	beta	omega
Alexithymia	-0.21	0.04	-0.35**	0.07	-0.11	0.01	-0.14	0.02
SCL - GSI	-0.16	0.01	0.11	-0.01	-0.04	-0.01	-0.19	0.02
Child's Age	0.19	-0.01	-0.09	0.01	0.35**	0.17	-0.24+	0.02
Mother's Age	-0.26+	0.04	-0.2	0.02	0.22+	0.03	0.14	0
		0.145+		0.155+		0.251**		0.126
		134.518		126.915		192.174		181.358
	$F(1,55) = 1.43, p = .24$		$F(1,55) = 0.75, p = .39$		$F(1,55) = 0.09, p = .76$		$F(1,55) = 2.02, p = .16$	

Project 1: Observing parenting through computer vision: can a multi-person body detection system predict the quality of parent-child interactions?

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Supervised by Lamberto Ballan, PhD, UNIPD and Alessandra Simonelli, PhD, UNIPD

Theoretical background

Parenting plays a fundamental role in children's social, emotional, and cognitive development. It refers to the ability to take care of someone else and requires the adult to be sensitive and responsive to the child's cues. As such, it is primarily evaluable through the observation of parenting behaviours enacted during everyday adult-child interactions, which provide a direct measure of the parent's ability to recognize, accurately interpret, and timely respond to the child's signals. Quality of parenting behaviours has been highlighted as an important predictor of children's developmental outcomes, as for example social competence, emotion regulation and the presence of emotional/behavioral problems. Moreover, different studies pointed out that parenting behaviours are likely to be disrupted or altered in at-risk conditions (e.g. parental psychopathology), with a significant impact on later child development. In this, the systematic and standardized observation of parent-child interactions is of particular importance in terms of screening, prevention, and finally to better understand the impact that parenting could have on children's wellbeing. Observational coding systems are usually applied to fragments of videotaped parent-child interactions and pay attention to a series of behavioral and interactive indexes, as for example timing, eye gaze, body orientation and physical proximity, which help the rater to outline the quality of the relationship observed. Anyway, although effective in the evaluation of parenting behaviours, observational coding systems could be expensive both in terms of time required for training and for gaining observational experience, and in terms of time required by the process of viewing and re-viewing the videos in order to correctly evaluate what is actually observed. For this reason, we propose to apply artificial intelligence notions to support psychologists in coding parent-child interactions and identify high risk parenting behaviours.

Objectives

The presented project proposal aims to exploit computer vision algorithms to extract features useful to evaluate the quality of the adult-child interaction. The final purpose is to obtain an automated tool that is able to support developmental psychologists in the evaluation of the quality of parenting behaviours observing the interactions between the child and the mother. More specifically, an automation of the behaviour/interaction codification has several advantages. First, it eliminates part of subjectivity due to human raters. Secondly, it allows the processing of a greater number of videos in few times, reducing consequently the work costs and giving more chance to psychologist to pay more attention to critical cases.

Participants

The study will involve two groups of parent-child pairs, one at high-risk due to parental psychopathology and the other one extracted from the general population.

Procedure

Parent-child dyads will be videotaped during 15-min free play condition. Quality of parenting behaviours and of parent-child interactions will be rated through a standardized observational coding system. Subsequently, the videos will be processed through a computer vision algorithm to automatically extract behavioral and interactive indexes.

Measures

Observational coding of parent-child interactions

Quality of parenting behaviours and of parent-child interactions will be rated through the Emotional Availability Scales (EA-Scales; Biringen, 2008), an observational instrument which considers four dimensions of parenting (sensitivity, structuring, nonintrusiveness and nonhostility) and two dimensions of the child's contribution to the relationship (responsiveness, involvement).

Adult sensitivity refers to quality of adult affects, clarity of perceptions and appropriate responsiveness, awareness of timing, flexibility, variety and creativity during play, acceptance of the child, amount of interactions and adequate resolution of conflicts.

Adult structuring concerns the use of proactive guidance, the success of attempts, the amount of guidance, the ability to set limits and to remain firm in the face of pressure, the use of both verbal and nonverbal suggestions and the ability to assume an adult role rather than a peer one.

Adult nonintrusiveness refers to the ability to follow the child's lead, to the use of non-interruptive ports of entry into interaction, to the modest use of commands and directives, to the appropriateness of teaching and adult talking, to the absence of interferences and of child's signals that indicate that the adult is perceived as intrusive.

Adult nonhostility refers to the lack of negativity in face or voice and to the lack of ridiculing or other disrespectful behaviours toward the child. A non hostile adult does not threaten to separate, is not frightening, maintains cool during challenging situations and does not use threats of hostile play themes during interactions.

Child responsiveness takes into account quality of child's affects and organization of behaviours, the ability and the willingness to respond to the adult's bids without anxiety or role reversal. It also considers positive physical positioning, concentration on task and the presence of avoidance or of over responsiveness and rolereversal.

Child involvement of the adult concerns the use of simple and elaborative initiative to involve the adult, the affective use of the adult (rather than instrumental), the lack of negative/over involving behaviours and the use of verbal and nonverbal channels.

Each EA dimension is given a global score on a 7 point scale, with higher ratings referring to more optimal features.

The coding system has been widely adopted to assess quality of parenting in different at-risk and non-at-risk populations, in different contexts (e.g. free-play, structured play, compliance tasks) and at different ages.

Automated extraction of behavioral and interactive features

Computer vision relates to how computers gain high-level understanding from digital images or videos (Szeliski, 2011). It consists in the automatic extraction of useful information from a single image or a sequence of images. Sub-domains of computer vision include scene reconstruction, event detection, video tracking, object recognition, 3D pose estimation, motion estimation, and image restoration. In particular, here we are interesting in human body and motion recognition, extracting information from videos. Moreover, we need to recognize body keypoints and motion of multiple agents (the adult and the child) who are interacting in the same video scene. To achieve this goal, we plan to use OpenPose (Cao et al., 2016). OpenPose is a library for real-time multi-person keypoint detection and multi-threading written in C++ using OpenCV and Caffe. It is a real-time system to jointly detect human body, face and hands. The system performance is invariant to the number of detected people in the image. OpenPose has already been applied to the observation of autistic children behaviour during therapy sessions augmented with humanoid robot (Rudovic et al., 2018). People in videos are identified with 130 points describing the position of the body parts in the space during a slot of time (see Figure 1).

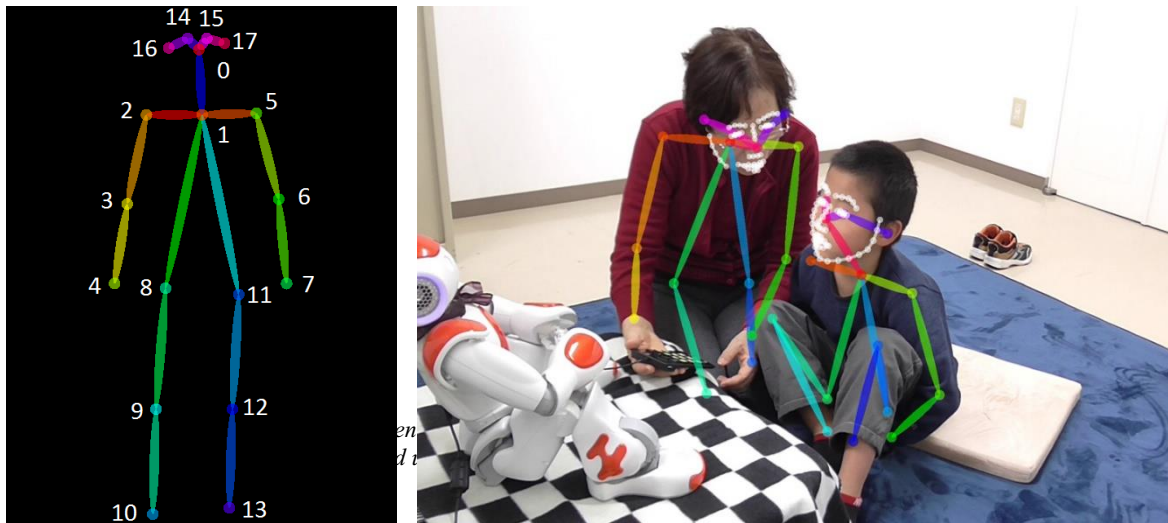


Figure 1: the left figure shows the segments of the body detected by OpenPose. The right figure is a frame extracted from an adult-child interaction during a therapy session with a humanoid robot (Rudovic et al., 2018) and analysed by OpenPose.

Through these 130 points, we plan to calculate a large number of key features describing the physical interaction between the child and the adult. For example, we will calculate: the average, minimum and maximum distance between the child and the mother; the duration of maximum and minimum child-adult distance; gaze direction and average duration of the eye contacts; number of touches; quantity of child motion.

Statistical analyses

Finally, the features extracted by OpenPose will be compared with the observational coding of the human raters and used to predict the quality of the child-adult interaction.

In particular, we plan to run a series of statistical comparisons (e.g., correlation analysis) between the features extracted by the computer vision algorithm (OpenPose) and the measures encoded by the raters evaluation. Then, a machine learning model (e.g., logistic regression or Support Vector Machine) will be trained to predict the quality of the adult-child interaction according to the features extracted by OpenPose. Machine learning (ML) refers to the study and construction of algorithms that can learn information from a set of data (training set) and make predictions for a new set of data (test set), without being explicitly programmed (Mitchell, 1997). ML is now the basis for a large number of applications, such as the self-driving cars, speech recognition (e.g. Siri), recommender systems, etc. In this study, we will learn information about the features related to the quality of the adult-child interaction from the video collected (training set) to make prediction on the quality of the adult-child interaction on new future videos (test set). In other words, our algorithm will be able to automatically predict the quality of the interactions for new future mother-child dyads.

Expected outcomes and possible scientific practical impact of the results

Usually, to gain information about quality of the mother-child interaction, at least two independent human observers encoding 15/20 minutes of video are needed. This process takes long times and requires a high expertise of the examiners. Through the automatic body detection system (OpenPose), we expected to extract more useful information about the adult-child interaction in few times (5 minutes of video). In particular we expected that:

- i) the features extracted by OpenPose are correlated with the human raters evaluation;

- ii) the features extracted by OpenPose give additional objective elements to the raters to determine the quality of the adult-child interaction;
- iii) the system is useful to identify aspects of risk in less time and with greater precision.

As consequence, the automatic and faster identification of low-quality parenting behaviours will allow the psychologist to focus their attention and spend more effort on high-risk mother-child dyads.

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*Quando ti metterai in viaggio per Itaca
devi augurarti che la strada sia lunga,
fertile in avventure e in esperienze.*

*I Lestrigoni e i Ciclopi
o la furia di Nettuno non temere,
non sarà questo il genere di incontri
se il pensiero resta alto e un sentimento
fermo guida il tuo spirito e il tuo corpo.
In Ciclopi e Lestrigoni, no certo,
nè nell'irato Nettuno incapperai
se non li porti dentro
se l'anima non te li mette contro.*

*Devi augurarti che la strada sia lunga.
Che i mattini d'estate siano tanti
quando nei porti - finalmente e con che gioia -
toccherai terra tu per la prima volta:
negli empori fenici indugia e acquista
madreperle coralli ebano e ambre
tutta merce fina, anche profumi
penetranti d'ogni sorta; più profumi inebrianti che puoi,
va in molte città egizie
impara una quantità di cose dai dotti.*

*Sempre devi avere in mente Itaca -
raggiungerla sia il pensiero costante.
Soprattutto, non affrettare il viaggio;
fa che duri a lungo, per anni, e che da vecchio
metta piede sull'isola, tu, ricco
dei tesori accumulati per strada
senza aspettarti ricchezze da Itaca.
Itaca ti ha dato il bel viaggio,
senza di lei mai ti saresti messo
sulla strada: che cos'altro ti aspetti?*

*E se la trovi povera, non per questo Itaca ti avrà deluso.
Fatto ormai savio, con tutta la tua esperienza addosso
già tu avrai capito ciò che Itaca vuole significare.*

Itaca - Constantino Kavafis