Certain and Uncertain Reflective Functioning in Mothers with Substance Use Disorder:

Investigating the Associations between Reflective Functioning, Trauma and Executive Functions

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Submitted as cand.psychol. thesis

Department of Psychology

THE UNIVERSITY OF OSLO

October 2017

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Abstract

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Main supervisor: Merete Glenne Øie. Co-supervisor: Bjørn Lau.

Background: Impairments in reflective functioning (RF) are known to have adverse effects on the ability to exhibit sensitive parenting as a caregiver. Several factors are associated with impairments in RF, such as level of executive functioning (EF), degree of trauma experienced and having a substance use disorder (SUD). However, no studies have investigated in what way these individual factors contribute to the specific RF impairments, such as pathological certain RF (RFQc) or uncertain RF (RFQu). Neither has there been studies investigating the relationship between these two forms of impaired RF and general measures of RF. **Methods:** In the current thesis, EF, RF and degree of trauma experienced in 43 mothers diagnosed with SUD were assessed. The occurrence of maternal (general) RF was assessed by administering the Parent Development Interview, while RFQc and RFQu were assessed using the Reflective Functioning Questionnaire 8 (RFQ-8). EF, trauma and SUD were assessed by administering various questionnaires, interviews and neuropsychological tests. The data used in this thesis are based on data already collected as part of an ongoing doctoral thesis called the "Mosaic Project"[1]. The data are cross-sectional and the relationships between the constructs of interest are investigated through covariate and multivariate analyses and descriptive data. **Results:** The results revealed that RFQu was significantly associated with maternal RF, while RFQc was not. The analyses revealed several significant associations between RF and trauma. High RFQu was more than twice as common in mothers reporting high amounts of trauma in adolescence, and almost three times as common in mothers reporting high amounts of trauma across the lifespan, compared with mothers reporting low amounts of trauma. When investigating the relationship between EF and RF, working memory, cognitive flexibility and planning turned out to be significantly associated with RFQu, with lower levels of EF correlating with higher levels of RFQu. The RFQc did, however, not show any significant associations. **Conclusion:** Results from this thesis indicate that trauma and EF are associated with uncertain RF style in mothers with SUD. Further, we suggest that EF may impair RF through the impediment of proper affect regulation. More research is needed in order to assess the relationship between RFQc and maternal RF, EF, trauma and SUD.

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[1]The "Mosaic Project" is a collaborative project between Lillehammer University College and Sykehuset Innlandet HF. The project aims to generate knowledge about important aspects in promoting competence development and well-being for children residing in families with parental substance abuse problems and/or parental mental illness.

Acknowledgements

It is with great pleasure and gratitude that we hereby submit our thesis. The time that has passed since we started punching data from assessment tools in February, to the proofreading of the final document in October, has been an exciting and rewarding process. During the last nine months, we have invested a lot of time and effort into what we have been writing about, and over time this has undeniably led to a strong sense of ownership of the final product. The process has at times been a challenging and tiresome one, but at the same time is has been very rewarding and interesting to attain insight into what it means to conduct research. Understanding the mechanisms at play in mentalizing has been an area of interest for the both of us throughout the study. Being able to take a closer look into this specific area of expertise has been experienced as meaningful and useful in regard to our development as future professional practitioners.

This thesis would not have been possible to write and complete, if it was not for our superb supervisors, Merete Glenne Øie (MØ) and Bjørn Lau at the Department of Psychology, University of Oslo. Thank you, Merete, for your constructive and sharp ideas, input and shared knowledge, and for the amount of time you put aside to guide us through the process of writing this paper. Thank you, Bjørn, for masterfully guiding us through the complex and ambiguous world of statistics and method. We are very grateful that you have been as available and present for us as you have been, whenever we have had issues we wanted to discuss or wanted your opinion on. We appreciate the confidence and faith we feel you as supervisors have placed in us throughout this process.

We would also like to thank Ulrika Håkansson (UH) at Lillehammer University College for sharing data material from your ongoing doctoral thesis, welcoming us aboard on your project and for sharing important academic input related to our project throughout the process.

Last but not least, we want to thank each other for the mutual trust, companionship, hard work and good times along the way.

Oslo, October 2017

Tore Bergby Handeland and Vidar Roald Kristiansen

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1 Introduction

1.1 Background

Several studies have made an effort to shed light on the relationship between mothers with different forms of psychopathology, hereunder substance use disorders (SUD), and their way of relating to their children. These studies highlight that as a group, mothers with SUD have an increased risk of child abuse and neglect (Pajulo, Suchman, Kalland, & Mayes, 2006) and are at risk of maladaptive parenting practices (Cash & Wilke, 2003; Mayes & Truman, 2002; Walsh, MacMillan, & Jamieson, 2003). Maternal SUD often damage the quality of parenting and the mother's ability to relate to their child (Siqveland, Smith, & Moe, 2012).

Research finds that although some mothers with SUD manage to provide parenting and a good enough home environment to support their children's development, the majority of these mothers do in one way or another lack the necessary skills and/or social support to manage this (Mayers & Truman, 2002; Siqveland, Haabrekke, Wentzel-Larsen & Moe, 2014). Common parenting difficulties include poor responsiveness to the children's needs, poor attachment and intrusiveness (Burns, Chethik, Burns, & Clark, 1997; Hans, Bernstein, & Henson, 1999; Solis, Shadur, Burns, & Hussong, 2012). As a group, mothers with SUD are often reported to have impairments in maternal reflective functioning (RF), also (misleadingly) referred to as mentalizing (Pajulo et al., 2006; Suchman, McMahon, Slade, & Luthar, 2005). Mentalizing may be defined as "…the fundamental human capacity to understand behavior in relation to mental states such as thoughts and feelings" (Allen, Fonagy, & Bateman, 2008). RF is the manifestation of the capacity to mentalize, even though the terms are often used interchangeably (Suchman, Ordway, de las Heras, & McMahon, 2016).

When mothers struggle with RF and mentalizing their children's needs, emotions and behavior, this may have a negative effect on the growth of this ability in their children. In turn, this may also have a negative impact on attachment patterns and child upbringing across generations (see Fonagy, Gergely, Jurist, & Target, 2004; Slade, Grienenberger, Bernbach, Levy, & Locker, 2005b). Because mothers with SUD have a greater risk for an impaired ability to mentalize, and because of the possible damaging effects of poor mentalizing on the

children's upbringing, it is important to acquire more knowledge about what may contribute to a weakened ability to mentalize.

There are several factors that all may contribute to the ability of a mother with SUD to mentalize. Prolonged and repeated trauma and substance abuse can have adverse effects on executive functions (EF) (e.g. Crean, Crane, & Mason, 2011), which is suggested to form the necessary, but not sufficient, basis for mentalization and RF (Stien & Kendall, 2004). The aim of this master thesis is to investigate how EF, trauma and drug abuse may be associated with mothers ability to mentalize about her own, as well as her child's, state of mind. In order to do this, we will first thoroughly present previous research about RF and mentalization, executive functions, substance abuse and trauma, and thereafter describe the possible association between them.

1.2 Mentalizing

As mentioned in last section (1.1) mentalization may be defined as "…the fundamental human capacity to understand behavior in relation to mental states such as thoughts and feelings" (Allen et al., 2008). This term is often used interchangeably with the term RF, the manifestation of the capacity to mentalize (Suchman et al., 2016). Among other things, the quality of, and extent to, which an individual is capable of RF depends on relational experiences in the individual's upbringing and the individual's emotional activation in the moment of mentalizing (Fonagy et al., 2004). Deficient RF is associated with the development of a wide range of psychopathologies (Katznelson, 2014).

The ability for RF is developed during infants' social interactions with their caretakers and peers. The infant starts to learn this skill by recognizing that caretakers and peers relate to the infant from their own perspective. Infants gradually grasp the understanding that their perspective is separate and distinct from that of their caretakers, and that others' actions are governed by intentions and desires (Ensink & Mayes, 2010; Katznelson, 2014). Infants may copy caretakers when they make faces, whereas by the age of 12 months children can often be seen turning to their caretaker in ambiguous situations in search of how to react (Stern, 1985). During infancy, children believe that everything they experience are universal truths, and during their first years of living they gradually develop an understanding that others experience the same situations differently, partially due to their prior experiences with similar

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situations (Fonagy, 2006). The theory of how mentalizing enables us to attribute mental states to others and oneself, as well as understand that one's own intentions, desires, beliefs and perspectives differ from others', is often referred to as Theory of mind (ToM) (Premack & Woodruff, 1978). Research shows that not before the age of four-to-five are children able to exhibit this ability (Callaghan et al., 2005; Sabbagh, Xu, Carlson, Moses, & Lee, 2006). Because caretakers are so important to infants and small children's development of RF, relational difficulties in this crucial and early age may damage the ability of RF (Fonagy, 2006). ToM gradually develops from the understanding that one's own mind is separate from others, to being able to exhibit advanced RF such as mentalizing about complex emotions, behavior and intentions. As the development of RF progresses, implicit RF – procedural, automatic and unconscious processes – becomes routine, while the individuals also gain the capacity for explicit RF. Explicit RF is a state in which individuals are able to explicitly think and speak about mental states (Allen & Fonagy, 2006).

When examining the construct of RF, there are several clinically meaningful ways this may be done. One possible way to examine RF is to subdivide the construct into self-mentalization (SM) and other-mentalization (OM), respectively. SM can be described as the "…ability to mentalize primarily about ones' own emotions and behaviors", whereas OM can be described as the "…ability to mentalize primarily about other's emotions and behaviors and about own interactions with others" (Suchman, DeCoste, Leigh, & Borelli, 2010, pp. 569). This division of RF into two closely related, but separate constructs carry some interesting and important clinical implications, and are described in some recent studies (e.g. Moulton-Perkins, Rogoff, Fonagy, & Luyten, 2011; Suchman et al., 2010).

The theory of the development of mentalizing and RF postulates that children must first learn to understand their own emotions, reactions and actions (SM), in order to later on be able to mentalize about other's mental states (OM). Thus, it is possible to divide the construct of RF into different "levels" of RF. The lowest level of RF would be to only understand one's own behavior and emotions (SM), while a higher level of RF might be to "understand that he understands what I understand" (OM). In this postulate lies the implicit assumption that SM should be a less cognitive demanding operation than OM, because it is per se necessary to "go through SM" to be able to OM, since we use information about how we perceive the world as a reference for how we think others perceive the world. This assumption has been supported by articles using "Theory of Mind" designs to prove that it takes a longer amount of time to

shift perspective from the self to others than the opposite, due to both differences in the complexity and automaticity of these tasks (Bradford, Jentzsch, & Gomez, 2015).

In research, RF also has been divided in different RF "styles" that are independent of the SM/OM dichotomy. Fonagy et al. (2016) developed the Reflective Functioning Questionnaire (RFQ, see section 2.1.5), which measures reflective style. The RFQ measures the degree of certainty(RFQc)/uncertainty(RFQu) the respondents experience in relation to their knowledge about their own (SM) and other's (OM) mental states. The RFQ is a relatively new instrument, which differs from more established clinical interviews measuring maternal RF, such as the Parent Development Interview (PDI) (Aber, Slade, Berger, Bresgi, & Kaplan, 1985; Jessee, Mangelsdorf, Wong, Schoppe-Sullivan, & Brown, 2016), by assessing RF through self-reporting.

Fonagy's initial studies of the RFQ indicate that in particular an uncertain RF style is linked to increased levels of self-harm, problems with affect regulation, higher levels of depression and personality pathology (Fonagy et al., 2016). On the other hand, a certain RF style was not as closely linked to psychopathology. However, it is important to notice that high levels of either style of mentalization are considered as negative entities, as they both reveal a respondent's failure to appreciate the opaqueness of mental states. The uncertain RF style prevents an adequate RF due to these individuals' characteristic concrete, rigid way of mentalizing, hence making individuals unable to consider complex ways of understanding others' and one's own mind. The certain RF style prevents adequate RF by making individuals too certain that their view of the world is the true and only one, thereby implying no need to mentalize about others' state of mind (Fonagy, 2006).

The certain and uncertain RF styles can be closely linked to the concepts of "psychic equivalence mode" and "pretend mode." Both concepts refer to modes of pre-mentalizing children experience during play and both can possibly help shed light on different forms of the failure of mentalizing among adults. Psychic equivalence mode, also known as hypomentalizing, is a mental mode in which individuals equate their outer reality with their inner mental reality (Fonagy & Target, 1996). Because this is seldom the case, individuals with this tendency are often intolerant of other, alternative perspectives, which in turn leads to an uncertain RF style characterized by individuals having concrete, rigid understandings of mental states. The uncertain RF style often causes these individuals to refrain from attempting to mentalize. Even though individuals possessing an uncertain RF style are sometimes aware

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of their limitations when it comes to understanding themselves and others, this is often not the case (Sharp et al., 2011). Patients diagnosed with borderline personality disorder often score well within the normal range on self-report assessment tools assessing empathy (Ritter et al., 2011). Empathy is regarded as a central component in RF in the process of understanding others. Even so, individuals with a borderline personality disorder usually perform worse than healthy controls on tasks designed to assess empathy (Preißler, Dziobek, Ritter, Heekeren, & Roepke, 2010; Sharp et al., 2011). The uncertain RF style may therefore get in the way of accurately responding to RF assessment tools.

In contrast, the pretend mode, also known as hypermentalizing, is a mental mode characterized by certainty when it comes to RF (Fonagy, 2006). Ideas often form no relationship between outer and inner reality, so that an individual's mental representations are missing a link to the external reality. The certain RF style includes the creation of mental representations of actions, while lacking satisfactory evidence in order to support the representations. The development of inaccurate models of the RF of others and oneself can often be recognized by others as long-winded and overly detailed statements that have little or no apparent relationship to outer, testable reality. Based on the vast amount of RF output, the certain RF style often makes these individuals believe they are "good mentalizers". This often results in biased responses on self-report assessment tools assessing RF (Fonagy et al., 2016). This mode is often characterized by meaninglessness, emptiness and dissociation as a consequence of trauma, and can often be perceived as protracted talk about feelings and thoughts. These conversations are often lacking the emotional component (Luyten & Fonagy, 2015).

A third pre-mentalizing state, called the teleological mode, is also identified. This is a state with an extreme exterior focus, in which only observable change or action is considered as a true indicator of the intentions of the other (Luyten & Fonagy, 2015). For example, affection is only "real" when accompanied by physical expression. Nevertheless, this state is not measured by the RFQ, and is therefore not further accounted for in this thesis.

Approximately between the ages of 2-5, children undergo a change where they go from changing between being in a "psychic equivalence mode", "teleological mode" and "pretend mode", to integrating these modes into the more reflective and complex RF of an adult. This process is typically facilitated by children experiencing that their mental states are reflected upon by caregivers (Fonagy, 2006). Genuine mentalizing is the ideal result of this prosess,

characterized by an understanding of the complexity of mental states, such as recognizing one's limits when it comes to understanding the mental state of oneself and others. Stated differently, genuine mentalizing is characterized by demonstrating a moderate certainty about the mental states of oneself and others, while at the same time grasping the fact that mental states are complex and sometimes partially inaccessible to us (Allen et al., 2008; Fonagy et al., 2004).

Due to the biased response type, both the certain and uncertain RF style lead to that a continuous scoring system assessing RF would likely conflate these widely different forms of RF impairment. Extreme responses on either end of a Likert scale may serve as an indication of qualitative differences in RF impairment, and not as an indication of how well-functioning your RF is. A too certain response to a statement like, "*I always know what I feel*" may simply reflect a hypermentalizing, too certain RF style, whereas an individual who strongly disagrees with this statement may lack a basic understanding of their own mental states, thus reflecting a hypomentalizing, too uncertain RF style. The scoring system of the RFQ accounts for the qualitatively different underlying interpretation by recognizing scores in the middle as adaptive RF scores, and recognizing scores in either extreme end as impaired RF (Fonagy et al., 2016; see section 2.1.5 for a detailed elaboration).

RF is important in order to overcome the daily challenges faced in situations demanding the understanding of both one's and other's mind. RF may be important for intelligent interpersonal communication. However, the relationship between RF and intelligence is an ambiguous one, as the few studies that have examined this relationship have shown conflicting results. In one study, Steele and Steele (2008) concluded that intelligence did not seem to correlate with RF, whereas another by Taubner, White, Zimmermann, Fonagy and Nolte (2013) found a modest correlation of .25 between the two constructs.

1.3 Executive Functions

Executive functions (EF) are important precursors to RF (Stien & Kendall, 2014; Zelazo, 2015). EF may be defined as a set of cognitive processes "necessary for complex goal-directed behaviour and adaptation to a range of environmental changes and demands" (Loring, 2015, pp. 143). EF serves the function of allowing us to be able to exert cognitive control over our behavior, cognitions and emotions (Diamond, 2013) – which in turn enables

us to successfully select and monitoring types of behavior that facilitate and lead us toward the attainment of desirable goals.

There exists a certain discrepancy between the theories surrounding EF as a construct, in regard to whether EF are to be understood as one big, united construct, or is better understood as several independent, but related, components. Miyake, Friedman, Emerson, Witzki, Howerter and Wager (2000) attempted to integrate these components into "the unitary and diversity view of EF." This theory proposes that EF consist of interrelated, but separate, distinct components: updating (working memory), inhibition and shifting (cognitive flexibility). There is a general consensus regarding viewing inhibition, working memory and cognitive flexibility as the core components of EF (Best & Miller, 2010; Diamond, 2013). Inhibitory control involves being able to control one's attention, behavior, thoughts, and/or emotions to override a strong internal predisposition or external lure, and instead do what is more appropriate or needed (Diamond, 2013). Working memory involves the active maintenance and manipulation of information within a limited timespan (Baddeley, 2003). Cognitive flexibility is being able to change perspectives spatially or interpersonally. In order to change perspectives, we need to inhibit (or deactivate) our previous perspective and load into our working memory a different perspective. It is in this sense that cognitive flexibility requires and builds on inhibitory control and working memory. A manifestation of this abilityinvolves changing how we think about something (thinking outside the box) (Diamond, 2013). Although not counted as one of the three core components of EF, planning is also recognized as an important EF. Planning is central in establishing and sequencing subgoals leading up to the desired outcomes (Hudson & Farran, 2011).

Kluwe-Schiavon, Viola, Sanvicente-Vieira, Malloy-Diniz and Grassi-Oliveira (2017) present an EF perspective emphasizing the dynamic balance between the degree of emotional salience and behavioral automaticity that different situations evoke. A situation is assessed according to two factors: 1) degree of emotional salience, and 2) degree of automatic versus goal-oriented behavior. According to this perspective, the role of EF is to automatize well-functioning behavior, and at the same time to monitor the situation's cognitive demands. This is done in order to determine whether the previous well-functioning behavior is sufficient or whether we need to come up with new strategies in new, emotionally salient situations. From this perspective, the "dynamic EF hypothesis" is presented: Individuals wish to maintain homeostasis, a state in which we are neither too detached, nor too stressed. When individuals

encounter situations in which previous, automatic behavior no longer suffices, stress occurs. Individuals with well-functioning EF facing this situation are able to inhibit inexpedient automatic behavior, such as the fight or flight response, and make use of information in the environment to respond properly to the environmental demand. This triggers new, goal-oriented behavior. Once the new behavior is incorporated and automatized, the individual return to homeostasis. Behavioral demands trigger a strong stress response overriding adaptive problem solving in individuals with less well-functioning EF. This leads to poor coping, thereby leading to frustration and even stronger emotional activation. This results in low transfer value for new, similar situations (Kluwe-Schiavon et al., 2017). In this way, low levels of EF create difficulties when faced with novel stressors, leading to a failure in adaptive problem solving and coping.

EF are neurologically supported by multiple distributed and cooperating, but anatomically separated, networks in the brain (Stuss & Levine, 2002), which are primarily confined to the frontal lobes (Yuan & Raz, 2014). Although some of the EF may be supported by different brain areas, they tend to work as a unity towards the attainment of collective, desirable goals (Friedman & Miyake, 2017).

The EF develop chronologically in accordance to their complexity. While inhibition and working memory, at least in the premature, precursor-like version, are developed during the first 3-4 years of life (Diamond, 2013), cognitive flexibility builds on these two and is developed considerably later in development (Davidson, Amso, Anderson, & Diamond, 2006; Garon, Bryson, & Smith, 2008). There is evidence which suggests that cognitive flexibility is used in its premature stage by age 4.5-5 years (Diamond, 2002). However, it is not before the ages of 7-9 that advanced forms of cognitive flexibility are seen (Davidson et al., 2006; Gupta, Kar, & Srinivasan, 2009). The development of EF show a developmental stability (Miyake & Friedman, 2012) that coincides with the development from "pretend mode" and "equivalence mode" from ages 2-5 to more advanced RF from the age of 6 and onwards. A more advanced form of RF occurs at about the same time as full-fledged cognitive flexibility starts to develop. The co-variation between the sequential development of EF and more complex RF operations has been found and investigated in several recent studies (e.g. Carlson, Claxton, & Moses, 2015; Powell & Carey, 2017).

From the start of primary school years and into early adolescence, the most important differences in how and whether individuals are capable of considering variables in the

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environment and acting on the acquired information occur. By the age of 15, working memory, cognitive flexibility and inhibition already closely resemble those of adults. The adolescent years are particularly important in regard to developing healthy and full-fledged EF. The use and maintenance of EF through childhood, adolescence and early adulthood are proven to be an important contribution to shaping and maintaining well-functioning EF (McCalla, 2013). Cross-sectional studies suggest that EF is not fully developed, in the sense of working optimally, before individuals are in their mid-to-late 20s (Friedman et al., 2016).

As described above, EF does lay the foundation for what may be considered "intelligent behavior" (e.g. by contributing to goal planning and problem solving). However, studies investigating the relationship between EF and intelligence tend to be rather inconclusive and ambiguous. The few studies that have examined the relationship between intelligence and EF have been inconsistent. Arffa (2007) reported that the amount of variance contributed by intelligence to executive function is modest but statistically significant in youth. In several studies with adults, EF measures were not substantially related to intelligence (Donders & Kirsch, 1991; Johnstone, Holland, & Larimore 2000). It has been suggested that intelligence could influence the development of EF through moderation, although how this occurs remains unclear (Arffa, 2007).

1.4 Substance abuse

Estimates shows that 10 years ago, probably as many as 200,000 children in Norway resided in a home marked by parental substance abuse and its accompanying effects on their caregiving (Solbakken & Lauritzen, 2006). Substance abuse among caregivers is known to have adverse effects on their children's upbringing (Mayes & Truman, 2002). Substance abuse is known to impair parenting behavior because it may make it difficult to pay attention to environmental cues, weakening emotion regulation, weakening judgment ability and EF in the mothers (Pajulo et al., 2012; Suchman, Mayes, Conti, Slade, & Rounsaville, 2004). There are many ways in which substance abuse can affect and damage EF and RF. The relationship between RF and substance abuse has been described as a two-way process by Allen, Fonagy and Bateman (2008). Substance abuse and intoxication weakens RF, both in relation to understanding oneself, and in relation to give attention to the mental states of others (Neger & Prinz, 2015). On the other hand, weakened or impaired "baseline RF" may contribute to frustration and high emotional arousal, which in turn is often resolved by using substances.

The latter implies that substance abuse also can be viewed as a clinical expression for weakened RF and accompanying problems with affect regulation (Söderström & Skårderud, 2009).

Apart from temporarily weakening an individual's ability to mentalize, substance abuse is also known to have long-lasting negative effects on the brain. Chronic alcoholism is shown to impair all EF related to RF processes: working memory, inhibition, cognitive flexibility and planning (Ratti, Bo, Giardini, & Soragna, 2002). The long-term negative effects on the brain may be divided broadly into two categories: 1) Altered and dysregulated neurotransmitter pathways due to long-term substance abuse leaves individuals vulnerable to stress and more prone to experiencing difficulties regulating emotions (Martin-Fardon, Zorrilla, Ciccocioppo, & Weiss, 2010), and 2) Acute brain trauma because of overdosing on substances, due to a lack of oxygen in the brain, causing hypoxic-ischemic brain injuries (Baldacchino, Tolomeo, Kahn, Humphris, & Carra, 2016). The former often results in a changed behavioral pattern in relation to rewards (Koob & Kreek, 2007). The most common SUD is caused by alcohol (World Health Organization, 2014). The long-term effects of cannabis use, a common substance used along with alcohol, shows that cannabis can also have adverse impairing effects on EF (Crean et al., 2011). Sedative drugs, such as opioids and alcohol, are the ones most often involved in cases of hypoxic-ischemic brain injuries due to their sedative effect on respiration and the flow of oxygen-rich blood to the brain (Pattinson & Wise, 2016).

1.5 Trauma

Van der Kolk defines psychological trauma as "the impact of experiences that overwhelm both psychological and biological coping mechanisms" (van der Kolk, 2003, pp. xii). Following today's diagnostic guidelines, psychological trauma often falls under the diagnostic term posttraumatic stress disorder (PTSD). This has been the case since PTSD first appeared in the diagnostic and statistical manual of mental disorders (DSM-III; American Psychiatric Association, 1980). However, the nature of psychological trauma may broadly be categorized based on the number of traumatic events: either as a single trauma (e.g. a natural disaster or car accident), or as multiple traumas. Although not recognized as an official diagnosis, the latter has been termed complex PTSD (CPTSD). Recent studies have shown that as many as 25% patients with a PTSD diagnosis also met the criteria for CPTSD (Wolf et al., 2015). Relational trauma is a form of CPTSD, and is defined as "an event in which a child's sense of

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emotional and/or physical safety has been ruptured or violated by the behaviors of adult caregivers" (Sheinberg & True, 2008, pp. 174).

Being exposed to trauma, and especially repeated, relational trauma in the form of physical and emotional maltreatment, is known to have adverse effects on the developing brain (Stien & Kendall, 2004), as well as the ability to mentalize about others' state of mind (Abate, Marshall, Sharp, & Venta, 2017; van Schie et al., 2017). Epidemiological research finds that the most frequent form of traumatization in women is childhood maltreatment. Physical, emotional and sexual maltreatment all have an impact on emotional well-being and health (Anda et al., 2006; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Neglect during childhood is also known as a common source for later developed trauma (van der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005). In addition to PTSD, relational trauma often also leads to a host of comorbid psychological problems in adolescence and adulthood, such as antisocial and borderline personality disorder, substance abuse, cardiovascular, metabolic and affective and sexual disorders, just to name a few (e.g. Cloitre, Tardiff, Marzuk, Leon, & Portera, 2001; Dube et al., 2001). In addition to being directly exposed to trauma, witnessing traumatic events is also known to lead to traumatization. This is documented to be able to have as grave consequences on maternal RF as being a direct subject of trauma (Schechter, 2003).

Experiencing recurring trauma in childhood is known to have adverse effects on RF (Anda et al., 2006; van der Kolk et al., 2005). Cumulative trauma during early childhood and adolescence, respectively, have been shown to be the two most powerful predictors of the severity of current CPTSD in adult samples (Spinazzola, Blaustein, Kisiel, & van der Kolk, 2001). Individuals can often endure a certain amount of trauma regardless of type without too grave consequences, but when the traumatic experiences occur too frequently psychopathology is much more likely to develop (Edwards, Holden, Felitti, & Anda, 2003; Felitti et al., 1998; Mersky, Topitzes, & Reynolds, 2013). Also, childhood trauma is known to be associated with a history of substance abuse in the family. In longitudinal studies childhood trauma is correlated with earlier and more comprehensive substance abuse in the traumatized individual later on, thereby potentially maintaining negative childhood conditions across generations (Taplin, Saddichha, Li, & Krausz, 2014).

1.6 The association between mentalizing, trauma, executive functions and substance abuse

Studies have shown an association between physical and emotional maltreatment in childhood and adolescence, and in later difficulties with RF (Abate et al., 2017; van Schie et al., 2017). Being exposed to relational trauma over time may affect the developing brain and EF, which are important precursors to RF (Stien & Kendall, 2004). Maltreatment is shown to lead to the dysregulation of both cortisol reactivity and cortisol levels (Tarullo & Gunnar, 2006). The hormone cortisol helps us to coordinate the functions of the body and the brain whenever a stressor is perceived (de Kloet, Joëls, & Holsboer, 2005). Cortisol dysregulation is associated with difficulties regulating emotions and difficulties related to managing stressful situations (England-Mason et al., 2017). The cortisol level is shown to be chronically elevated in individuals exposed to trauma (Heim, Newport, Mletzko, Miller, & Nemeroff, 2008; Elzinga, Schmahl, Vermetten, van Dyck, & Bremner, 2003). A chronically elevated level of cortisol may have adverse consequences on the development of EF in children, as this over time leads to the damaging of brain cells in a critical developmental phase (Frodl & O'Keane, 2013).

Weakened EF may lead to sub-optimal behavior- and affect regulation, which in turn is related to RF difficulties when it comes to understanding a child's inner world (Fewell, 2010). As described in section 1.2, RF may be divided into several dimensions, whereby one concern is the automatic versus controlled RF. When under stress, we have a tendency to fall back on automatized behaviors (Yu, 2016). Individuals who have not developed well-functioning RF are likely to fall back on one of the three pre-mentalizing states: the pretend mode, the psychic equivalence mode or the teleological mode. Luyten and Fonagy (2015) show that the brain areas involved in controlled, effortful RF are the same as the areas involved in EF (Kluwe-Schiavon et al., 2017; Yuan & Raz, 2014). When exposed to stressors, we rely on heuristics and previous successful behavior (Yu, 2016). Individuals with poor EF will often not be able to engage in controlled RF, because they are often not able to make use of information in the environment in order to respond properly to the environmental demand exposure to stressors causes. However, when confronted with a video of their own behavior later on in a controlled stressor-free environment, individuals with poor EF, resulting in poor controlled RF, are often able to reflect upon and understand their own behavior from different points of view (Beer, John, Scabini, & Knight, 2006).

Experiencing relational trauma during childhood and adolescence does sometimes result in individuals adapting an uncertain and unstable RF style (Allen, 2003; Fonagy & Bateman, 2008; see also section 1.2). Trauma might also lead to the certain RF style by the development of a defensive inhibition of RF, in which the individual wishes to refrain from considering the malicious intent from a verbally or physically violent figure, only focusing on their own mind (Fonagy et al., 2004). These individuals are also known for having trouble in setting aside thinking or responses that have become routine, in order to use new strategies to accommodate environmental challenges (e.g. trying to challenge their own rigid RF pattern) (Choi-Kain & Gunderson, 2008). This might be explained by how these children experience traumatic relational events; children may react with a parasympathetically dominated "shut down" in order to mentally protect themselves from the event. Experiencing this neurological deactivation during relational trauma often leads to similar responses in later situations in which external triggers (e.g. witnessing intoxicated caregivers, witnessing verbally/physically aggressive caretakers) initiate the response (Schauer & Elbert, 2015). This enables the child to maintain a positive view of caregivers as offering a secure base and a safe haven.

In situations where the reflexive, automatic behavior is insufficient to achieve goals, individuals have to use and manipulate available information in the environment in order to be able to modify their behavior and achieve their goals. This operation puts high demands on both working memory and inhibition (Kluwe-Schiavon et al., 2017). A dysfunctional working memory and/or capacity of inhibition may therefore unable an individual to take in and manipulate information in order to both SM and OM. Impariments of EF may thus make it hard for an individual to challenge a rigid and certain RF style.

The relationship between trauma and SUD is complex. Physical and emotional maltreatment in childhood and adolescence are associated with later substance abuse (Rich, Wilson, & Robertson, 2016; Taplin et al., 2014). Research shows that substance abuse itself may indirectly cause trauma, e.g. through exposure to episodes in substance-abusing environments, such as witnessing friends die, violence, prostitution and so on (Cuomo, Sarchiapone, Giannantonio, Mancini, & Roy, 2008). However, the link between substance abuse and trauma is a complex one; for some individuals, SUD may lead to traumatic experiences, whereas for others, traumatic experiences may later lead to a problematic use of drugs (Hien, Cohen, & Campbell, 2005).

As a group, mothers with SUD often show difficulties interpreting and understanding the needs of their children. The interaction between mother and child is an important factor for the mothers, as the quality of this interaction is often an important part of the assessment regarding whether the mother is maintaining or losing custody of her child. Research shows that the mother's RF lays an important foundation for the child's social, cognitive and psychological development, particularly during the infant years, in which the mother-child dyadic interaction is shown to be of great importance for the development of attachment style in the child (Swain et al., 2014; Taplin et al., 2014). In this thesis, we divide the concept of RF into certain and uncertain RF, and investigate these subcategories of RF against factors such as trauma and EF. To the best of our knowledge, this has never been done before. In order to be able to successfully offer and treat mothers with RF deficits, it is of paramount importance to undertand how factors such as substance abuse, trauma and EF relate to different types of RF deficits.

1.7 The current study

Aims and hypotheses (1, 2 and 3):

In this thesis, we want to investigate how, and to what degree, the RFQ measures relate to trauma and EF in mothers with SUD. There is only preliminary evidence for the validity and reliability of the RFQ-8 scales (Luyten and Fonagy, 2017). Therefore, in order to make use of these scales as legit measures of RF, we first wanted to test the construct validity of the RFQ-8. This was done by investigating the RFQ scales' relationship to the maternal RF score obtained by the PDI. Based on previous research and theory on the bimodal division in RFQ (certain/RFQc and uncertain/RFQu style of RF; Fonagy et al., 2016), we hypothesized that both higher RFQu and RFQc covariates with lower overall RF scores on the PDI, demonstrating two different ways of failing to properly mentalize.

The second aim was to examine whether (and if it does, how) trauma affects uncertain and certain RF. Trauma is known to later lead to various kinds of psychopathology (Gershuny, Najavits, Wood, & Heppner, 2004) and trauma in childhood might have especially grave consequences (Spinazzola et al., 2001). Both certain and uncertain RF are associated with psychopathology (e.g. Fonagy et al., 2016, see also section 1.2). We therefore hypothesized that:

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Higher uncertainty- and certainty scores covariate with trauma as follows:

a. When the trauma was experienced moderates the correlation, with the amount of earlier experienced trauma correlating more strongly (resulting in higher certain and uncertain RF) than the amount of trauma reported later on.

b. The amount of total trauma, with higher amounts resulting in higher certain and uncertain RF

The third aim was to examine the association between the two scales in the RFQ and EF. To the best of our knowledge, no prior research has investigated this. Research shows that, on a general basis, EF and RF are correlated (Beer et al., 2006; Deater-Deckard, Wang, Chen, & Bell, 2012; Fewell, 2010). We therefore wanted to conduct exploratory analyses in order to investigate the potential correlation between single EF and the two RFQ scales. An EF test battery was assembled in order to gather EF data (see section 2.1.6).

2   Methods

2.1   Participants

In this study, 43 mothers (M age = 31 years, SD = 6.4 years, range 19 to 44) with substance abuse disorders were recruited, either while being pregnant or during their postpartum period (Håkansson, Söderström,Watten, Skårderud & Øie, submitted manuscript, 2017). Twenty-five mothers (58.1%) were recruited from different treatment facilities specializing in treating and taking care of pregnant women and families with infants, and a concurrent substance abuse problem. Twelve of the women (27.9%) were recruited from outpatient clinics, and six mothers (14.0%) were recruited by health nurses working in the nearby municipalities. The recruitment period lasted for two years. The inclusion criteria were a former substance abuse problem and a current SUD. The exclusion criteria were premature birth (<32 weeks and <1500 g), multi-parity, multi-handicapped or a severely ill child, or an estimated full-scale IQ below 70 in the mothers. Children with neonatal abstinence syndrome (NAS) were not excluded. Different levels on the factors "severity of former substance abuse" and "comorbid mental illnesses" did not serve as exclusion criteria. To the best of our knowledge, all the mothers were abstinent during the assessment period. For the majority of the mothers (62.8%), the child they participated in this study with was their first-born. Even though 16 of the mothers (37.2%) also had older children, only one (2.3%) had custody for the older child in this study. The rest of the children either resided in foster care facilities or with their father. When the assessment took place, the range of the children's age in this study was from four to 18 months (M 8.6, SD=3.8). This is a suitable age to assess the mother-child relationship (Siqveland & Moe, 2014). There were 28 boys (65.1%) and 15 girls (34.9%). Eleven (25.6%) of the children was born with NAS, and received medical treatment for this. During the inclusion period, 12 of the mothers (27.9%) lost custody of the child participating in the study. For more descriptive data, see Table 1.

2.1.1 Socio-demographic background data

The participants had a mean of 11.5 years of school. As shown in Table 1, most of the women (51.2%) started, but did not finish, high school. Twenty-two mothers (51.2%) did not have a partner and 14 (32.6%) had a cohabitant/were married. Seven (16.3%) had a partner who was

not a cohabitant, while 24 of the mothers (55.8%) reported that the father of the child had an ongoing substance abuse problem. Fifteen of the mothers reported that the father previously had a substance abuse problem, but were abstinent at the time of the study. Four mothers (9.3%) reported that the father never had a substance abuse problem. For more socio-demographic variables, see Table 1.

2.1.2 Mental health data

The participants showed substantial mental health problems, reporting an array of different mental health disorders. The most common were anxiety disorders (most frequently reported were PTSD (67.4%) and panic disorder (60.5%)), previous depression (95.3%), self-harm (65.1%) and previous suicide attempts (67.4%). Relative to its prevalence, anorexia (37.2%) and psychosis (41.9%) were also very frequently reported. For more mental health data, see Table 1.

2.1.3 Substance abuse data

As many as 74.4% of our participants reported a problematic relationship with many narcotic substances. The most frequently reported problematic drug was cannabis (81.4%), followed by medicational drugs (74.4%). Surprisingly (relatively speaking), only 41.9% reported a problematic use of alcohol. The most frequently preferred substances were Amfetamine/Cocaine (37.2%) and Opiates (32.6%). The lowest mean debut age was 13.09 years for alcohol (N=42, SD=2.98). For more substance abuse data, see Table 1.

Table 1

Sample characteristics

Demographic data	Range	Mean(SD)	
Mother's age	19-44	31.07 (6.37)	
Child's age (months)	1-18	8.56 (3.79)	
Number of children	1-4	1.51 (.80)	
Children in daily custody	0-2	1.00 (.22)	
Longest coherent period of work	0-132	31.07 (31.78)	
Civil status:	Number	Percentage	
Cohabitant	14	32.6	
Romantic partner	7	16.3	
Single	22	51.2	
Partner substance abuse:			
Ongoing	5(21)	23.8	
Earlier	12(21)	57.1	
No	4(21)	19.0	
Fathersubstance abuse:			
Ongoing	24	55.8	
Earlier	15	34.9	
No	4	9.3	
Highest completed education:			
Did not complete Primary school	2	4.7	
Primary school	23	53.5	
High school	12	27.9	
Graduate or professional degree	6	4.7	
Mental health data [a]	Number	Percentage	
Current depression	16	37.2	
Previous depression	41	95.3	
Previous suicide attempt	29	67.4	
Self-harm	28	65.1	
Mani	16	37.2	
Bipolar	2	4.7	
Panic	26	60.5	
Agoraphobia	12	27.9	
Social phobia	21	48.8	
Obsession	11	25.6	
Compulsion	5	11.6	
OCD	1	2.3	
PTSD	29	67.4	
General anxiety	23	53.5	
Psychosis	18	41.9	
Drug induced psychosis	22	51.2	
Schizophrenia	0	.0	
anorexia	16	37.2	
bulimia	8	18.6	
Binge eating	4	9.3	
Substance abuse mother [b]	Preferred (%):	Debut mean (SD)	Problematic %
Alcohol	16.3	13.09(2.98) (N=42)	41.9
Medicational	0	18.08(5.79) (N=37)	74.4
Cannabis	14.0	16.21(4.39) (N=42)	81.4
Amfetamin/Cocaine	37.2	17.82(4.42) (N=38)	72.1
Opiates	32.6	20.28(5.95) (N=25)	46.5
Design	0	18.53(3.38) (N=15)	-
Sniffing	0	14.44(1.74)(N=9)	-
Many	-	18.36(4.78) (N=36)	74.4

Note. N=43 SD= standard deviation. a) Mini-International Neuropsychiatric Interview 5.0.0 manual b) European Addiction Severity Index (Europ-ASI) 5th edition.

2.2 Measures

2.2.1 Mental health and use of psychoactive substances

The European Addiction Severety Index (Europ-ASI)

The use of psychoactive substances was registered using the European Addiction Severity Index (Europ-ASI) 5th edition (Kokkevi & Hartgers, 1995; McLellan et al., 1992), Norwegian version (Lauritzen, 2010). Europ-ASI is a semi-structured clinical interview that contains questions assessing working situation, support status, social relationships and family, legal and illegal substance abuse and somatic and psychological problems. The reliability and validity for Europ-ASI has been reported to be satisfactory (Kessler et al., 2012; Kokkevi & Hartgers, 1995; McLellan et al., 1992).

Mini-International Neuropsychiatric Interview 5.0.0 manual (M.I.N.I):

Screening for comorbid psychiatric disorders was done by administering the M.I.N.I. The M.I.N.I is designed as a brief semi-structured clinical interview, used as a screening tool for neuropsychiatric disorders in DSM-IV and ICD-10 (Sheehan et al., 2006). The English version of the interview has shown acceptably high valididty and reliability scores (Sheehan et al., 2006). The Norwegian version administered to the mothers in our sample has also shown acceptable test-retest reliability when tested in an acute psychiatric ward, but little research has been done on the Norwegian version of the test (Mordal, Gundersen & Bramness, 2010).

2.2.2 Reflective Functioning Questionnaire-8 (RFQ-8)

RFQ-8 is a self-report questionnaire designed for RF assessment (Fonagy et al., 2016). The RFQ measures the degree of certainty/uncertainty the respondents experience in relation to their knowledge about their own and others' mental states.

The RFQ version administered to the mothers in this sample contained 54 questions (RFQ-54). The administration of this questionnaire took place before a series of confirmatory and exploratory analyses were done across the samples used in the original validation studies (Badoud et al., 2015; Fonagy et al., 2016) on the six items with the highest loading on their

respective factor (Luyten & Fonagy, 2017), creating the RFQ-8. The developers of the RFQ recommends using the RFQ-8 for research purposes (Luyten & Fonagy, 2017). The RFQ-8 was therefore used in this article. Although there are no articles published on the reliability and validity of the RFQ-8, the eight items included in the RFQ-8 were all part of the original RFQ, with findings providing preliminary evidence for its reliability and validity (Badoud et al., 2015; Fonagy et al., 2016).

Every question in the RFQ is to be answered on a Likert scale from 1, indicating that the respondent "strongly disagrees", to 7, indicating that the respondent "strongly agrees". Items are scored using either a median scoring method or a polar scoring method. Median-scored items (e.g. "I always know what I feel") are designed in a way that high scores are scores that reflect the respondent's understanding of the opaqueness of mental states. For scoring purposes, this is done by scoring these items using the "1-3-5-7-5-3-1" format, in which scores in the middle ("partly agree" or "partly disagree") get high scores, while responses in the extreme ends of the scale reflect poor RF. On the other hand, polar-scored items (e.g. "I realize that I can sometimes misunderstand my best friends") are designed in a way that high scores are responses in one of the extreme ends of the scale (depending on the framing of the question). For scoring purposes, this is done by scoring these items using the "1-2-3-4-5-6-7" format (Fonagy et al., 2016).

All of the items that make up RFQ-8 are median-scored items (see Table 2 for a presentation of these items). To calculate the "certainty/uncertainty" score, they are turned into polar-scored items: For instance; "I don't always know why I do what I do" is a median-scored item used in the calculation of both the certainty and uncertainty scale. To calculate the certainty score on this item, the scores were recoded to: "3-2-1-0-0-0-0". The highest score would be obtained by choosing alternative 1 – "strongly disagree", yielding a score of 3 on the certainty scale for this item. To calculate the uncertainty score, the polarization would be the other way: 0-0-0-0-1-2-3. The highest score on the uncertainty scale would be obtained by choosing alternative 7 – "strongly agree", yielding a score of 3.

Table 2

The questions of RFQ-8

RFQu:	
u2:	**I don't always know why I do what I do.**
u4	**When I get angry I say things that I later regret.**
u5	**If I feel insecure I can behave in ways that put others' backs up.**
u6	**Sometimes I do things without really knowing why.**
u7	I always know what I feel.
u8	Strong feelings often cloud my thinking.
RFQc:	
c1	People's thoughts are a mystery to me.
c2	**I don't always know why I do what I do.**
c3	When I get angry I say things without really knowing why I say them.
c4	**When I get angry I say things that I later regret.**
c5	**If I feel insecure I can behave in ways that put others' backs up.**
c6	**Sometimes I do things without really knowing why.**

Note. Statements in **bold text** are in both scales (in RFQu and in RFQc).

The RFQ-8 questionnaire is relatively new, and has no well-established or validated cut-off for clinically high scores on its scales (P. Luyten & A. Moulton-Perkins, personal communication, 2 June, 2017). The total score for each of the scales in this study were calculated by adding together the scores and dividing by the number of items included (6). The cut-off was set at 1 for both scales. Scores above 1 were categorized as high, and scores below were categorized as low/normal. This cut-off was set based on the assumption that a mean score of at least one on either of these scales represents a marked mentalizing style.

2.2.3 Executive Functions (EF)

Neuropsychological assessments of maternal EF included measures of the following EF:

Cognitive Inhibition

In order to assess cognitive inhibition, the Color-Word Interference Test, Condition 3, from the D-KEFS (Delis, Kaplan & Kramer, 2001) was administered. The task consisted of looking at colored words, and instead of reading the words the participants were to say the color in which the word was printed. This inhibition task was to be finished as quickly as possible. Both the number of errors committed and the longer time used to complete the task indicated difficulties with inhibition, and provided lower t-scores. As a tool measuring cognitive inhibition, this test has exhibited a satisfactory validity and reliability (Delis et al., 2001; Homack, Lee, & Riccio, 2005).

Working Memory (WM)

In order to measure maternal WM, the Letter-Number Sequencing sub-test from the Wechsler Intelligence Scale 4th Edition (Wechsler, 2008) was administered. This test measures WM by presenting participants with a series of mixed numbers and letters at 1-second intervals, with increasingly longer series. The goal is for the participant to repeat the series by first repeating the numbers presented in order from the lowest to highest, followed by the letters in alphabetical order. Longer spans and higher scores indicate a higher WM capacity. The subtests of WAIS-IV show a satisfactory reliability and validity (Wechsler, 2008), including Letter-Number Sequencing. However, the Letter-Number Sequencing sub-test mostly measures auditory/verbal WM, and not so much spatial/visual WM (Egeland, 2015).

Cognitive Flexibility

In order to assess cognitive flexibility, the Color-Word Interference Test, Condition 4, from D-KEFS (Delis et al., 2001) was administered. Participants were asked to switch between naming the color in which the word is printed, and reading the color word. This cognitive flexibility task was to be finished as rapidly as possible. Both the number of errors committed and the longer time used to complete the task indicated difficulties with cognitive flexibility, and provided lower t-scores. Validity and reliability of the Color-Word Interference Test has been reported to be satisfactory (Delis, Kramer, Kaplan, & Holdnack, 2004).

Planning

In order to assess planning, the Tower Test of the D-KEFS was administered (Delis et al., 2001). This test measures rule learning, and the ability to establish and maintain instructions and planning. The task consisted of placing discs of varying sizes onto three vertical pegs on a board. The end product was supposed to match a picture in front of the participants, and this was to be done as effectively as possible, both in regard to the time used and the number of movements. The complexity of the task increased as it progressed, from starting with two discs to ending with five discs. Both a higher frequency of errors and a longer time used to complete the task indicated difficulties in planning, resulting in lower t-scores. The validity and reliability of the Tower Test has been reported to be satisfactory (Delis et al., 2004).

2.2.4 Traumatic Antecedents Questionnaire (TAQ)

The TAQ is a 41-item self-report questionnaire, which assesses traumatic experiences at four different age periods: early childhood (0-6), school age (7-12), adolescence (13-18) and adulthood (Luxenberg, Spinazzola, & Van der Kolk, 2001). Traumatic experiences are gathered in 10 domains: (1) Competence, (2) Safety, (3) Neglect, (4) Separation, (5) Emotional Abuse, (6) Physical Abuse, (7) Sexual Abuse, (8) Witnessing, (9) Other Traumas, and (10) Alcohol and Drugs. It is possible to calculate summary scores for each of the 10 domains, and across the four age periods. The TAQ is scored by asking respondents to rate to what degree they experienced certain statements during each age period on a scale from 0-3, with 0 indicating "never or not at all" and 3 indicating "often or very much". Domain 1 and 2 assesses adaptive functioning, whereas a domain of 3-10 assesses trauma/adverse events. Higher scores on the domain of 3-10 represent increased levels of accumulated risk for the development of mental disorders.

Research utilizing this instrument has shown preliminary evidence for the instrument's incremental validity (Luxenberg et al., 2001; Spinazzola et al., 2001), but only a few studies have investigated the psychometric properties of the questionnaire (Spinazzola et al., 2001). The test has been found useful in the assessment of particular components regarding complex trauma, although it was not specifically developed for this purpose.

Because TAQ has many variables, we would face the problem of multiple comparisons if all of the 10 domains across the four age periods were to be included in analyses. Multiple comparisons are a problem because the chances of a rare event occuring increases with the number of variables/analyses preformed, so the likelihood of incorrectly rejecting a null hypothesis increases. To counteract the problem of multiple comparisons, we removed the theoretically least interesting variables from our sample in accordance with our hypothesis. This involved competence and safety, because these two domains assess adaptive functioning, and not trauma. To reduce the number of analyses even further we combined the rest of the variables into five composite variables: we calculated total trauma in the four different age periods (childhood, school age, adolescence and adulthood) and one variable for total experienced trauma across all ages.

For the purposes of the present study, a high/low categorical variable was created for each of the composite variables by applying a median split (organizing the scores from low to high

and dividing the sample in the middle). Some of the variables had middle values which was also the mode (the most common score for that variable). Therefore, some of the trauma measures are not split in the middle. The principles followed when this was the case were to: 1) split the groups so they were approximately equal, and if possible 2) place the mode within the high group. The dichotomous variables generated from these guidelines received cut-offs as follows: 0 through 1.43 was coded as low for childhood trauma. 0 through 1.67 was coded as low for trauma in school age, 0 through 1.89 was coded as low for trauma in adolescence, 0 through 2.00 was coded as low for trauma in adulthood and 0 through 2.00 was coded as low for total trauma across age. Scores above the low-cut-offs were all coded as high. For more descriptive information about the dichotomous TAQ-variables, see Table 5.

2.2.5 Parent Development Interview-R2 (PDI-R2)

PDI-R2 is a semi-structured interview consisting of 20 questions designed to examine parents' understanding and a narrative of their child and their self. During the interview, different themes concerning thoughts, feelings and intentions are addressed, both within the mother herself and within the child. The interviewer focuses on how these aspects might affect mental processes and behaviors in the person reflected upon (i.e. herself or the child). The interviews were scored on a 11-point scale, from -1 to 9, in which a higher score indicated higher RF (Slade, Bernbach, Grienenberger, Levy, & Locker, 2005a). A score of -1 indicates negative RF, and the participant must have given bizarre or openly hostile responses to get this score. A score of 9 indicates exceptional RF, and is only given when the person shows full, rich and nuanced reflections during the interview. Scores above 5 indicate intact and well functioning RF in the population at large (Slade, 2005), but particularly stressed and vulnerable populations a score of 4 is set as the limit for indicating intact and functioning RF. Our sample is to be considered a vulnerable group. Mothers with scores of 4 or above in our sample are considered to have intact and functioning RF. The cut-off was set at 3 – mothers having scores of 3 or lower were considered to have impairments in their mentalizing ability.

The validity of the PDI is found to be satisfactory in both populations consisting of parents with SUD and non-clinical populations (Levy & Truman, 2002; Slade, 2005).The PDI-R2 interview was recorded and transcribed from audio files. The transcribed interviews were coded according to the guidelines for RF evaluation (Fonagy, Steele & Steele, 1998) by an

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independent reliable coder who was not familiar with the participants. Another coder scored 25% of the interviews to assess inter-rater reliability, which was 93% and considered as satisfactory. In the cases in which the two coders disagreed, the rating of the first coder was used.

2.3 Procedures

The participants were examined, either in the treatment facility where they were living, or at home. They were assessed using the Europ-ASI, TAQ, RFQ-54, MINI and PDI-R2, and they also completed neuropsychological assessments. The data was collected from a large battery of assessments, and only selected and relevant results are presented in this thesis. Each participant met with an assessment administrator three to six separate times in order to complete the test battery, with every session lasting from one to two hours. The total estimated time spent collecting data was approximately seven hours per family. A clinical psychologist (UH), supervised by a specialist in clinical neuropsychology (MØ), collected all the data. The parts of the test battery used in this thesis took approximately four hours to collect per respondent.

2.4 Ethical considerations

To include individuals with substance use disorder (SUD) in research projects raises certain ethical concerns. Conditions that may reduce a participant's ability to give informed consent, such as ongoing substance use, counts as exclusion criteria in the project application approved by The Norwegian Regional Committee for Medical Research Ethics in Eastern Norway (REC-Øst, Nr. 2012/1370). The study was conducted in accordance with the Helsinki Declaration of the World Medical Assembly (see also Håkansson, Halsa, Söderström, Skårderud, & Øie, 2015).

The participation in the study was voluntary, and despite the fact that research shows that mothers with SUD and child upbringing tend to be an unfortunate combination, the information revealed in the study was not supposed to have negative consequences in the form of how their ability as caregivers was assessed. The trade-off between the importance of assessing mothers with SUD, while the findings at the same time should not have negative consequences for the mothers involved, is often difficult.

Studies investigating mothers with SUD, and how they understand themselves and their children, are highly sought after due to the importance of promoting the development of treatment to accommodate their needs, in order to enable the mothers to meet their child's needs. This kind of research should therefore have a high priority. The participants gave written consent to be included in the study.

2.5 Statistical analyses

All cases ($n = 43$) were included in the analyses, and there was no missing data. All statistical analyses were carried out using IBM Statistical Package for Social Sciences (SPSS) version 24.

Aim 1 – Test of the construct validity of the RFQ scales

In aim 1, an investigation of the descriptive properties of the reflective functioning measures were done first. In order to examine the association between the maternal reflective functioning and the RFQ scales, Pearson coefficient correlation analyses were performed.

Aim 2 - Test of association between RF and trauma

To examine the association between trauma and the RFQ scales, a Fisher's exact probability test was conducted. In order to conduct the Fisher's exact test, the variables need to be dichotomous. Descriptive information concerning frequencies for the dichotomous TAQ and RFQ variables are presented first. The Fisher's exact test is recommended instead of chi-square when performing analyses on small samples such as ours (Howit & Cramer, 2011, p. 152-171). This recommendation is based on the fact that the chi-square estimates an approximate chi-square distribution (Field, 2009, pp. 723-724; Howit & Cramer, 2011, pp. 152-171), in which the approximation becomes reliable with sample size. A Fisher's exact test is not sensitive to sample size because it calculates the actual probability distribution, and therefore calculates the exact probability of the frequency table (Field, 2009; Howit & Cramer, 2011). Because both RFQ and TAQ are ordinal measures, gamma and Kendall's tau B were chosen, yielding both a conservative (Kendalls' tau B) and a liberal (gamma) correlation coefficient estimate.

Aim 3 – Test of correlation between RFQ scales and EF

In aim 3 of the study, descriptive data of EF and intelligence measures are presented first. Before investigating the relationship between the RFQ scales and EF, an investigation of the potential confounding factors was executed. A Pearson correlation coefficient analysis was conducted to test for significant correlations between intelligence measures (e.g. nonverbal, verbal and total IQ score) and constructs of interest (e.g. RFQu, RFQc and EF measures). Whether intelligence should be controlled for or not has been a subject of debate (Dennis et al., 2009), but controlling for this variable was found to be reasonable in this study (see section 1.2 and 1.3), while other correlates, i.e. SUD characteristics and mental health, were not included as control variables because of their causal relations with the constructs investigated in this thesis (for a further elaboration of this, see section 4.4.2)

A Pearson correlation coefficient analysis was executed to investigate the correlation between the RFQ scales and EF. Two multiple regression analyses were used to investigate this correlation further: the RFQ scales were entered as dependent variables and the measurements of EF as independent variables. All EF variables were entered simultaneously in order to attempt to illuminate the unique variance accounted for by each.

A collinearity diagnostic was performed in order to investigate a potential problem of multiple collinearity (between EF measures). Multiple collinearity is a phenomenon in which one predictor in a multiple regression model can be predicted with a substantial degree of accuracy from the other predictors. The predictive power or reliability of the model as a whole is not affected by multicollinearity, as it only affects calculations regarding individual predictors. This diagnostic was therefore performed to examine whether the partial regression coefficients (for specific EF) were reliable in our multiple regression analyses. The specific collinearity diagnostic chosen was variance inflation factor (VIF). The VIF indicates whether a predictor has a strong linear relationship with the other predictors.

3   Results

3.1 Aim 1 – the construct validity of the RFQ scales

Before reporting the results of aim 1, the descriptives of the mentalizing measures will be presented (see Table 3). The group of mothers showed considerably higher scores on the RFQu than the RFQc. In our sample, the uncertain reflective style therefore seems to be more prevalent than the certain reflective style. As indicated by the standard deviations, variability was also greater for the RFQu scores than for the RFQc scores. Scores indicated a poor average maternal RF for the group, as 74.4% of the mothers scored 3 or lower, although the scores also revealed a moderate variability in the ability for maternal RF.

Table 3

Reflective functioning descriptives

Reflective functioning	Range	Mean(SD)	Clinical cut-off
Maternal RF [a]	6-0	2.91(1.17)	3.00
RFQc [b]	2-0	0.47(.49)	1.00
RFQu [b]	3-0	1.28 (.85)	1.00

Note. N=43 SD= Standard deviation,
[a] Parent Development Interview-R2, [b] Reflective Functioning Questionnaire-8.

The first aim of this study was to examine the construct validity of the two scales in the RFQ by calculating their Pearson correlation coefficient with the PDI (measuring maternal RF). As shown in Table 4, RFQu was significantly correlated with PDI, in which higher RFQu scores predicted lower PDI scores, thereby indicating that an uncertain RF was associated with an impaired maternal RF. The RFQc scale was not significantly associated with PDI.

Table 4

Pearson correlation coefficients between maternal RF and the RFQ scales

Functions		1	2
1	Maternal RF	-	-
2	Certain RF	0.12	-
3	Uncertain RF	-0.52**	-0.60**

Note. 1) Parent Development Interview-Revised, Reflective Functioning Scale. 2-3) Reflective Functioning Questionnaire-8.
*p < .05, **p < .01

3.2 Aim 2 – RFQ scales and trauma

The second aim was to examine the implication of trauma on RFQu and RFQc. We wished to investigate if: 1) when the trauma was experienced, and 2) the amount of total trauma experienced was predictive of the RFQu and RFQc scores. We will summarize the results for both scales separately below, but before we go into the results, some descriptives concerning the creation of the dichotomous variables included in the subsequent analyses will be presented.

As shown in Table 5, the cut-off at 1 for the RFQ scales created considerably different splits for the dichotomous RFQ variables. The dichotomous RFQc variable contains few participants categorized as belonging to the high group, while the dichotomous RFQu variable has approximately equal groups. The median split of the dichotomous TAQ variables produced equally large groups categorized as high and low. The cut-off values for the TAQ variables show increased trauma scores in adolescence and adulthood, with less trauma reported in childhood and school age.

Table 5

Frequencies for the dichotomous TAQ- and RFQ variables

Variables:	Cut-off	Percent high (n)	Percent low (n)
RFQ:			
RFQu	1	55.8% (24)	44.2% (19)
RFQc	1	18.6% (8)	81.4% (35)
TAQ:			
Trauma in childhood	1.43	46.5% (20)	53.5% (23)
Trauma in school age	1.67	55.8% (24)	44.2% (19)
Trauma in adolescence	1.89	53.5% (23)	46.5% (20)
Trauma in adulthood	2.00	48.8% (21)	51.2% (22)
Total trauma across age	2.00	51.2% (22)	48.8% (21)

Note. TAQ= traumatic antecedent questionnaire. childhood (0-6), school age (7-12), adolescence (13-18) and adulthood.

3.2.1 RFQu and trauma

As shown in Table 6, when analyzing the implications of *when* trauma was experienced, we found no significant relationship between the amount of early (childhood and school age)

experienced trauma and RFQu scores. On the other hand, trauma experienced in adolescence was significantly related to RFQu. High scores on the RFQu were more than twice as common in the group having experienced high amounts of trauma in adolescence, compared to the group that had not.

As shown in Table 6, the relationship between the amount of *total trauma* reported and RFQu was significant. We found that high amounts of trauma were close to three times as common in the group with high RFQu scores, compared to the group with low RFQu scores.

Table 6

Fisher's exact test showing the relationship between RFQu and trauma (TAQ)

Taq/trauma – scales [a]		RFQu=0 (low)		RFQu=1 (high)		Fisher (p-value)	Kendalls' Tau-B	Gamma
		Frequency	%	Frequency	%			
Trauma in childhood	Low	12	63.2	11	45.8	.36	.17	.34
	High	7	36.8	13	54.2			
Trauma in school age	Low	10	52.6	9	37.5	.37	.15	.30
	High	9	47.4	15	62.5			
Trauma in adolescence	Low	13	68.4	7	29.2	.01	.39*	.68*
	High	6	31.6	17	70.8			
Trauma in adulthood	Low	11	57.9	11	45.8	.54	.12	.24
	High	8	42.1	13	54.2			
Total trauma	Low	14	73.7	7	29.2	.01	.44**	.74**
	High	5	26.3	17	70.8			

Note. N=43, Fisher = Fisher's exact probability test, 2-tailed
[a] measured by the traumatic antecedent questionnaire. Childhood (0-6), school age (7-12), adolescence (13-18) and adulthood.
*p < .05, **p < .01, 2-tailed, exact

3.2.2 RFQc and trauma

Neither of the Fisher's exact tests were significant when RFQc was used in the analyses (see Table 7), nor were there any trends; the amounts of trauma (in total and in different time periods) were not appreciably more common in either of the two groups.

Table 7

Fisher's exact test showing the relationship between RFQc and trauma (TAQ)

Taq/trauma scales		RFQc=0 (low)		RFQc=1 (high)		Fisher (p-value)	Kendalls' Tau-B	Gamm
		Frequency	%	Frequency	%			
Trauma in childhood	Low	19	54.6	4	37.5	1.00	.03	.09
	High	16	45.7	4	62.5			
Trauma in school age	Low	16	45.7	3	37.5	1.00	.06	.17
	High	19	54.3	5	62.5			
Trauma in adolecence	Low	16	45.7	4	50.0	1.00	-.03	-.09
	High	19	54.3	4	50.0			
Trauma in adulthood	Low	17	48.6	5	62.5	.70	-.11	-.28
	High	18	51.4	3	37.5			
Total trauma	Low	16	45.7	5	62.5	.46	-.13	-.33
	High	19	54.3	3	37.5			

Note. N=43 Fisher= Fisher's exact probability test, 2-tailed
[a] measured by the traumatic antecedent questionnaire. Childhood (0-6), school age (7-12), adolescence (13-18) and adulthood.
*p < .05, **p < .01, 2-tailed, exact

3.3 Aim 3 – RFQ scales and EF

The third aim was to examine the association between the two scales in the RFQ and EF. This was done through both bivariate and multivariate analyses, and these results are summarized separately below. Before going through the results of aim 3, some cognitive descriptives are presented (Table 8). Of the EF, cognitive flexibility and inhibition, and to some extent working memory, stood out as being impaired in our sample, while scores on planning capacities were close to average, compared to average scores in a normal population (Delis et al., 2001). Of the IQ-measures, only verbal IQ are to be considered low, while the overall mean IQ score was close to the normative average, and all the mothers were within the normal range (two standard deviations from the normative average, 70-130). As indicated by the standard deviations, variability (in scores) was in general normal for cognitive tests.

Table 8

Cognitive descriptives

Executive functions	Range (t-scores)	Mean(SD)
Working Memory [a]	25-65	41.16 (8.82)
Inhibition [b]	20-65	39.81 (11.33)
Cognitive Flexibility [b]	20-63	35.16 (11.40)
Planning (tower) [c]	30-59	45.07 (6.50)
Intelligence measures (WASI)[d]	Range (IQ)	
Verbal IQ	55-127	89.72 (17.08)
Nonverbal IQ	74-132	98.8 (14.02)
Total IQ	71-125	94.14 (14.61)

Note. N=43 SD= Standard deviation
[a] Letter-Number Sequencing sub-test from the Wechsler Adult Intelligence Scale 4th Edition; [b] Color-Word Interference Test, Conditions 3 and 4 from the Delis-Kaplan Executive Function System (D-KEFS); [c] Tower Test from the Delis-Kaplan Executive Function System (D-KEFS); [d] Wechsler Abbreviated Scale of Intelligence.

3.3.1 Bivariate analyses

Before investigating the bivariate relationship between RFQ and EF, a Pearson correlation coefficient analysis was performed to investigate whether IQ was a confounding variable influencing the relationship between EF and RFQ. This analysis showed that IQ measures (nonverbal, verbal and full-scale IQ) were not significantly correlated to EF, RFQu or RFQc. The magnitude of the correlations ranged between .-.23 and .14. IQ measures were therefore not included as a control variable in the subsequent multiple regression analyses.

To investigate the association between RFQ and EF, a bivariate Pearson correlation coefficient analysis was performed, see Table 9 for a presentation of correlations. The following items correlated significantly with the uncertainty scale: working memory (r= -.47), cognitive flexibility (r= -.40) and planning (r=-.34). Hence, having an uncertain RF style (high scores on RFQu) was related to decreased executive functioning in our sample. None of the EF significantly correlated with RFQc, though all correlations between RFQc and EF (although weak and non-significant) were positive, which might show a trend in which increased EF scores are associated with higher RFQc scores. Consequently, having a more certain RF style (high scores on certain RF) might be associated with increased executive functioning in our sample.

Table 9

Pearson correlation coefficients between RFQ scales and EF

Variables	1	2	3	4	5	6	7
1. Uncertainty[a]							
2. Certainty[a]	-.60**						
3. Working memory [b]	-.47**	.19					
4. Cognitive flexibility[c]	-.40**	.27	.64**				
5. Inhibition[c]	-.19	.28	.72**	.64**			
6. Planning[d]	-.34*	.23	.65**	.61**	.61**		

Note. N=43.
[a] Reflective Functioning Questionnaire, the 8-item version; [b] Letter-Number Sequencing sub-test from the Wechsler Adult Intelligence Scale 4th Edition; [c] Color-Word Interference Test, Conditions 3 and 4 from the Delis-Kaplan Executive Function System (D-KEFS); [d] Tower Test from the Delis-Kaplan Executive Function System (D-KEFS)
*p < .05, **p < .01

3.3.2 Multiple linear regression analyses

As shown in Table 10, a multiple linear regression analysis, with RFQu as dependent variable and EF as independent variables, showed that all the EF explained 35% of the variance in RFQu (adjusted R^2=.25). Working memory significantly predicted RFQu, though neither inhibition, cognitive flexibility or planning did.

Table 10

Multiple linear regression analysis with EF (independent) and RFQu (dependent)

Variable	RFQu		
	B	95% Cl (B)	β
Constant	1.248	[.69, 4.63]	-
Working memory[a]	-.06**	[-.10, -.02]	-.60
Cognitive flexibility[b]	-.02	[-.05, .01]	-.26
Inhibition[b]	.03	[-.01, .06]	.33
Planning[c]	-.01	[-.06, .04]	-.08
R^2	.35		
F	3.27*		

Note. N=43 Cl=confidence interval.
[a] Letter-Number Sequencing sub-test from the Wechsler Adult Intelligence Scale 4th Edition 35; [b] Color-Word Interference Test, Condition 3 and 4 from the Delis-Kaplan Executive Function System (D-KEFS); [c] Tower Test from the Delis-Kaplan Executive Function System (D-KEFS).
*p < .05, **p < .01

The results of the multiple linear regression analysis, with RFQc as the dependent variable and EF as independent variables, are shown in Table 11. The total regression model for RFQc was not significant (p=0.16, R^2=0.22, adjusted R^2=.09), nor were any of the partial regression coefficients (working memory, cognitive flexibility, inhibition and planning).

Table 11

Multiple linear regression analysis with EF (independent) and RFQc (dependent)

Variable	RFQc		
	B	95% CI	β
Constant	.05	[-1.18, 1.29]	-
Working memory[a]	.00	[-.03, .02]	-.05
Cognitive flexibility[b]	.00	[-.02, .02]	.03
Inhibition[b]	.01	[-.01, .03]	.26
Planning[c]	.02	[-.02, .05]	.20
R^2	.22		
F	1.67		

Note. N=43 CI=confidence interval.
[a] Letter-Number Sequencing sub-test from the Wechsler Adult Intelligence Scale 4th Edition; [b] Color-Word Interference Test, Conditions 3 and 4 from the Delis-Kaplan Executive Function System (D-KEFS); [c] Tower Test from the Delis-Kaplan Executive Function System (D-KEFS).
*p < .05, **p < .01

Collinearity diagnostic

We found numerous correlations between distinct EF (see Table 9), in which the following items correlated most highly with each other: inhibition and working memory ($r= .72$), planning and working memory ($r= .65$) and cognitive flexibility and working memory ($r= .64$). Because of these high correlations between EF, a collinearity diagnostic of the multiple regression analyses was executed (see Table 12). None of the specific variation inflation factors (VIF) indicated multicollinearity, even with a strict cut-off VIF>5 (Bowerman & O'Connell, 1990). By contrast, the mean VIF was substantially greater than 1 (VIF mean = 2.10), hence indicating that the partial regression coefficients (for each specific executive function) are less reliable than preferred. The unique variance in the RFQ scales explained by each of the EFs must therefore be interpreted with some caution in the multiple regression analyses. The reliability of the regression analysis as a whole (all EF together) is unaffected.

Table 12

Collinearity diagnostic of the independent variables (EF) of multiple regression analyses

Variables	VIF
Working memory [a]	2.62
Cognitive flexibility[b]	2.27
Inhibition[b]	2.66
Planning[c]	2.20
Mean	2.44

Note. N=43 Dependent variables= RFQu and RFQc. VIF = variation inflation factor.
[a] Letter-Number Sequencing sub-test from the Wechsler Adult Intelligence Scale 4th Edition; [b] Color-Word Interference Test, Conditions 3 and 4 from the Delis-Kaplan Executive Function System (D-KEFS); [c] Tower Test from the Delis-Kaplan Executive Function System (D-KEFS)

4   Discussion

4.1 The construct validity of the RFQ

In this section, we assess and discuss the construct validity of the RFQ. In order to assess this, we investigated the relationship between the two scales of the RFQ (RFQu and RFQc) and the maternal RF score obtained from the PDI. To the best of our knowledge, scores from the RFQ have never been investigated in relation to scores from the PDI. This was considered important to investigate before conducting further analyses with the RFQ, as we wanted to make sure that the RF measures obtained by the RFQ did measure the areas of the same construct as the PDI, RF. We expected higher levels of both the certain and uncertain RF style to be negatively correlated with the maternal RF measure in the PDI. As predicted, we found a moderate negative correlation between maternal RF (PDI) and RFQu, where higher uncertain RF scores predicted lower maternal RF. Contrary to our hypothesis, a certain RF was not significantly correlated with the maternal RF score in the PDI.

The significant association between RFQu and PDI is in line with existing research conducted on the RFQu and its properties as a measure of RF. The preliminary validation of the RFQ as a RF assessment questionnaire has generally relied upon the development of items ("statements") theoretically supposed to measure either hypo- or hypermentalizing. A series of confirmatory and exploratory analyses were done on these items, illuminating the six items with the highest loading on their respective factor. The RFQ scales have also shown concurrent validity when investigated against the parental reflective functioning questionnaire (PRFQ, see Fonagy et al,. 2016). However, the PRFQ is also a recently developed questionnaire in need of further validation (Luyten, Mayes, Nijssens, & Fonagy, 2017). Further, the RFQ has been shown to have significant correlations with constructs closely related to RF (showing convergent validity), such as measures of mindfulness (Mindful Awareness Attention Scale), empathy (Basic Empathy Scale) and perspective-taking (Perspective Taking Subscale of the Interpersonal Reactivity Index) (Fonagy et al., 2016), as well as other constructs found to be negatively correlated with RF (showing discriminate validity) (depression, self-harm, difficulties regulating affect and personality pathology; Fonagy et al., 2016).

The findings on the RFQc was not in line with our hypothesis. The existing research is

divided concerning the relationship between RFQc, RF measures and closely related constructs: RFQc has been shown to be negatively associated with maladaptive personality functioning, negatively associated with the trait anger and positively associated with anger control (Fonagy et al., 2016). Nonetheless, the theoretical understanding of the development of pathological levels of RF (see section 1.2) clearly suggests that certain RF is a type of RF deficit (Fonagy et al., 2004), which stands in opposition to our findings.

Several qualified explanations may help shed light on the lack of any significant correlation between RFQc and maternal RF.One plausible explanation may be that individuals with high certain RF scores have a tendency to assess their own RF capacity based on the sheer amount of RF output produced, regardless of the quality of the RF. This may lead individuals with high certain RF scores to believe that they are "good mentalizers", which in turn creates a biased response style (Fonagy et al., 2016). The PDI is a semi-structured RF assessment tool, assessing RF by questions and answers during an interview. It is possible that individuals with high levels of certain RF can get a PDI score that does not reflect their real RF capacity, because their "pseudo-mentalizing statements" may come through as statements that are given high scores. It may be difficult for the raters to evaluate the authenticity of-, or to what extent the participant being interviewed is in emotional contact with, the statements made. Although high levels of a certain RF are an indication of an RF deficit, it is possible that the way this RF-deficit is expressed is not considered, measured or weighted by the PDI. The second explanation is a statistical one, and will discussed in section 4.4.1.

Considering our results as a whole, we consider the RFQu scale as having a satisfactory construct validity. It is because of the statistical limitations (see section 4.4.1) in this study not possible to draw any conclusions concerning the construct validity of RFQc.

4.2 The effect of trauma on certain and uncertain RF

In this section, we will review and discuss the findings between the RFQ scales and trauma. We hypothesized that trauma experienced in childhood would have the greatest impact on the RFQ scales, and that the severity and frequency of experienced trauma would lead to higher scores on both RFQ scales. In the two following sections, we will present and discuss the results for these hypotheses.

4.2.1 The association between age of experienced trauma and RFQ

No significant associations were found between RFQc and trauma experienced across age spans. This is discussed separately in detail in section 4.4 – Statistical pitfalls, as the lack of significance is likely to have a statistical, rather than clinical explanation. Therefore, in this section we will focus on RFQu, and its unexpected, but interesting, findings. The results from our analyses show that, contrary to our belief, trauma experienced in adolescence had the greatest impact on RFQu. High scores on the RFQu were more than twice as common in the group having experienced high amounts of trauma in adolescence, compared to the ones who had not. Contrary to our hypothesis, we found no significant association between RF and trauma in childhood or school age, nor did we find one in adulthood.

Experiencing recurring trauma in childhood is known to have adverse effects on RF (Anda et al., 2006; van der Kolk et al., 2005), and it seems to have the gravest effects on psychopathology in adulthood (Spinazzola et al., 2001). However, several explanations may be able to reveal why experienced trauma in adolescence turned out to be the age period significantly associated with RFQu.

When exposed to repeated trauma, resorting to "self-medication" in order to cope with psychological distress is a known phenomenon (Brady, Back, & Coffey, 2004; Garland, Pettus-Davis, & Howard, 2013). Whereas younger children seldom have either the access to or knowledge about legal and/or illegal substances, adolescents often do. Our sample of mothers with SUD had a relatively early debut of both the use and abuse of substances (see Table 1 for descriptive data). Research also shows that substance abuse often leads to further psychological distress (Garland et al., 2013) and social isolation (Chou, Liang, & Sareen, 2011).

Although the majority of research conducted on the developmental trajectory of EF focuses on the development in childhood, the development of EF in adolescence is also investigated (Selemon, 2013). This research highlights that EF is mediated by the prefrontal cortex (PFC) (Yuan & Raz, 2014), the region of the brain that matures the latest (Kolb et al., 2012). For this reason, adolescence is considered an important age span for the development of EF such as working memory, inhibition and cognitive flexibility (Best & Miller, 2010; Diamond, 2013). The onset of substance abuse due to trauma (possible self-medication for psychological distress) in adolescence may disturb the developing brain during this critical period (Selemon,

2013). To complicate this matter even further, the adolescent brain is found to be particularly prone and vulnerable to developing an addiction to substances. This is due to the responsiveness and plasticity to environmental factors (such as substance abuse) in the PFC circuitry during this age span (Chambers, Taylor, & Potenza, 2003; Crews, He, & Hodge, 2007). It is also possible that substance abuse may in itself lead to trauma, as previous substance abuse may lead to an earlier exposure to traumatic experiences in substance abusing environments, such as witnessing overdoses, witnessing friends die, prostitution, violence and so on (Cuomo et al., 2008). To summarize, being exposed to trauma in adolescence may lead to substance abuse, which is known to have adverse effects on EF and the developing brain, leading to impairments in RF. Further, trauma and substance abuse can form a vicious circle, where one problem increases the other.

The adolescent years also differ from childhood in respect to how RF is learned and acquired. During childhood, RF is primarily taught by interactions with caregivers (Huber, McMahon, & Sweller, 2015), although as the child ages, peers progressively play a more important role in the acquisition and development of RF (Caputi, Lecce, Pagnin, & Banerjee, 2012). In the adolescent years, the capacities of adaptive coping with environmental challenges are still developing (Zimmer-Gembeck & Skinner, 2011) at the same time as demand from the social environment increases (Margolin & Gordis, 2000). Being exposed to trauma in adolescence can lead to social isolation (Cook et al., 2005). For example, adolescents exposed to repeated trauma have been found to have lower school attendance (DeSocio & Hootman, 2004). Exposure to trauma and mental illness can also lead to individuals seeking out peers in similar life situations (e.g. experiencing domestic violence, substance abuse and depression; Dingle, Cruwys, & Frings, 2015). Both scenarios have the potential of complicating the RF development potentially taking place during social interactions with peers. Individuals spending vast amounts of time by themselves during the adolescent period may not be exposed to a sufficient amount of social interaction to acquire well-functioning RF, as social interaction is of key importance for the development of RF (Choi-Kain & Gunderson, 2008). Seeking out adolescent peers in similar situations, or seeking out substance abusing environments, may lead to a different RF dilemma. RF development hinges on corrective experiences and feedback in order to develop a better understanding of others and one's own emotions and reactions (Bateman & Fonagy, 2010). Burdened social networks may not be able to provide these corrective experiences and the feedback necessary to facilitate the development of RF.

As mentioned earlier, the total amount of trauma experienced in childhood and school age were not significantly associated with RFQu. Childhood and school age are shown to be phases in life in which children are vulnerable to trauma (De Bellis & Zisk, 2014; Marusak, Martin, Etkin, & Thomason, 2015). However, it looks like experiencing trauma in adolescence trumps experiencing trauma in childhood, perhaps due to the additional harmful factors (e.g. substance abuse and a substance abusing network) potentially accompanying trauma in adolescence. There was also no significant association between trauma experienced in adulthood and RFQu. Trauma experienced in adulthood is known to potentially lead to psychopathology and RF deficits, although research finds that exposure to trauma in adolescence leads to considerably higher levels of depressive symptoms (Dunn, Nishimi, Powers, & Bradley, 2017). Nevertheless, in a sample in which the vast majority has already experienced large amounts of trauma, it seems that the impact the trauma makes during the developmentally important age span of adolescence is of greater importance for the development of RF than the impact of trauma in adulthood.

4.2.2 The association between the severity and frequency of trauma and RFQ

No significant associations were found between RFQc and the severity and frequency of trauma, which is discussed separately in detail in section 4.4 – Statistical pitfalls. Therefore, in this section we will focus on the significant association between total trauma experienced and RFQu. In line with our hypothesis, high amounts of trauma were close to three times as common in the group with high RFQu scores, compared to the ones with low RFQu scores. This is consistent with the body of research which finds that experiencing repeated relational trauma over time has different and more adverse effects on the developing brain than a single trauma (Sherin & Nemeroff, 2011). This can be partially explained by the degree of predictability linked to single versus repeated trauma. Single trauma, such as nature disasters and car accidents, are by its nature relatively unpredictable events. On the other hand, repeated relational trauma is rather predictable in the sense that individuals know *that* something is going to happen, but not *when*. The repeated relational traumas become a chronic source of everyday stress in exposed individuals (De Bellis & Zisk, 2014). Whenever individuals are faced with a stressor, the hormone cortisol is secreted from the adrenal glands as a result of stress-induced activity in the hypothalamic-pituitary-adrenal (HPA) axis (Nesse, Bhatnagar & Ellis, 2016). Individuals exposed to recurring relational trauma learn to always

be on the lookout for potential threats in the environment, and this causes a chronic hyper-activation in the HPA axis, causing the secretion of harmful amounts of cortisol over time (Stephens & Wand, 2012; see Miller, Chen and Zhou (2007), for an in-depth review of cortisol secretion in PTSD). This has been shown to have adverse effects on brain regions associated with EF in the developing brain (Watt, Weber, Davies, & Forster, 2017), as well as leading to later difficulties managing stressful situations and regulating emotions (England-Mason et al., 2017), which is of key importance in order to exhibit well-functioning RF (Rutherford, Goldberg, Luyten, Bridgett, & Mayes, 2013). Moreover, a high secretion of cortisol in childhood and adolescence, and its impact on the brain, has been shown to make individuals more prone to developing SUD later in life (Khoury, Tang, Bradley, Cubells, & Ressler, 2010), thereby making the development of RF even more difficult.

In summary, it seems that there exists research that may be used to support our finding that the severity and frequency of trauma has important implications on the development of an uncertain RF style. This association may partially be explained by the effect that trauma has on the reactivity of the HPA axis.

4.3 The association between EF and RFQ

The third aim was to examine the association between the two RFQ scales and EF. As far as we know no prior research has investigated this. We conducted exploratory analyses in order to investigate the potential correlation between single EF and the two RFQ scales, and in this section will review and discuss these findings.

Our analyses did not find any significant associations between RFQc and EF. This is discussed in detail in section 4.4.1. In contrast, RFQu and EF were significantly associated: the bivariate analyses (Pearson's r) showed that a higher score of RFQu was associated with a significantly lower score of working memory (WM), cognitive flexibility and planning. However, WM was the only significant predictor in the multivariate regression analysis with RFQu. We will emphasize the results of the bivariate analysis, since the VIF indicates that the partial regression coefficients (for each specific executive function) are less reliable than preferred. For a further discussion of the VIF and the high correlation between the specific EF, see section 4.4.2 – General limitations. The results concerning the relationship between RFQu and EF will be discussed in the next paragraphs (4.3.1)

4.3.1 The association between EF and RFQu

Our results concerning WM are in line with contemporary research in the field of RF. Our sample turned out to have a lower than normative average score on WM (see Table 8 – Cognitive descriptives). This may, e.g, include difficulties focusing attention over time and focusing attention only on goal-relevant stimuli when facing situations evoking high levels of affect (Hofmann, Schmeichel, & Baddeley, 2012). An example of this is the WM task "goal shielding", the shielding of affect-regulatory goals important for managing the task. "Goal shielding" works by sustaining attention onto these goals, resulting in the blocking of irrelevant, affective stimuli from entering our focus (Dreisbach & Haider, 2009). WM is regarded as a limited attentional resource, meaning that lower levels of WM more often are going to lead to trouble in focusing the attention on goal-relevant information (Knudsen, 2007). Having a well functioning WM capable of "goal shielding" enables individuals to effectively contain complex mental states of self and others, and can therefore be viewed as a necessity in order to use RF. It is therefore not surprising that we find a significant association between WM and RFQu in our sample. High levels of RFQu may partially be accounted for by deficits in the WM tasks referred to above.

We also found that a more uncertain RF was associated with deficits in cognitive flexibility capabilities. Cognitive flexibility is known to play a central role in affect regulation through being a central piece in the "cognitive control dilemma." On average, our sample turned out to have a lower-than-average score on cognitive flexibility (see Table 8 – Cognitive descriptives), with the mean being 1 standard deviation from the normative average. Considering this, it is fair to assume that our sample is likely to experience mild-to-moderate deficits in tasks that depend on cognitive flexibility. For instance, this may include difficulties assessing the pros and cons in regard to means leading to a goal, as well as in regard to the goal in itself (e.g. "Are my options better, or should I stick to my original plan?"). The "cognitive control dilemma" states that self-regulating individuals have to continuously consider trade-offs between the alternatives of seeking different alternative actions ("flexibility") or rigidly sticking to a focal goal ("rigidity") (Goschke, 2003). High levels of affect are known to increase rigidity (Yu, 2016). A well-functioning cognitive flexibility may allow individuals to abandon suboptimal means and seek out more efficient strategies in order to reach a goal (Marien, Aarts, & Custers, 2012). Cognitive flexibility may also help individuals refraining from pursuing a self-regulatory goal in order to pursue a new,

seemingly more profitable goal (Fishbach, Zhang, & Koo, 2009). Consequently, high levels of cognitive flexibility may allow individuals to consider alternative actions and interpretations, even when facing situations triggering high levels of affect. It is therefore plausible that the significant association between cognitive flexibility and RFQu in our sample can be explained through how cognitive flexibility enables individuals to interpret the situation in different ways, e.g. to mentalize, leading to effective affect-regulation, which further increases the ability of flexibility.

A more uncertain RF was associated with lower scores on the EF planning, which is closely related to the more comprehensive EF cognitive flexibility (Miyake et al., 2000). Planning enable us to decide order, choose the necessary actions, assign cognitive resources to tasks and establish a plan of action in order to achieve goals (Diamond, 2013). Planning is also a necessary part of properly executed affect regulation (Heilman, Crişan, Houser, Miclea, & Miu, 2010) by aiding individuals in mentally anticipating how an event is going to play out, and planning possible actions and reactions. Planning may hence be viewed as important in anticipating how one's own behavior may affect others and vice versa. This may serve as a theoretical explanation as to why poor planning capabilities is significantly associated with high RFQu scores.

Although not significantly associated, our analyses show how inhibition may be negatively correlated with RFQu. Inhibition is shown to play an important role in self-regulatory processes such as affect regulation. It is therefore reason to believe this trend in the data material might have been significant had our sample been larger. For instance, inhibition is shown to play an important part in self-regulation through the active inhibition of behaviors such as impulses and habits that are not in accordance with one's goals (e.g. Berkman, Falk, & Lieberman, 2011; von Hippel & Gonsalkorale, 2005).

In summary, several of the EF investigated in this thesis turned out to be significantly associated with RFQu. Our EF measures were obtained through the use of tasks measuring EF in so-called "cold", non-affective states. Although not explicitly measured, it is possible that the association between EF and RFQu, at least partially, is explained by EF's important role in enabling the use of RF as an affect regulation tool. Kluwe-Schiavon et al. (2017) point out that a central task for EF is indeed to moderate behaviour to changing environmental demands when exposed to stress, and that a failure in doing so may result in falling back on reflexive, automatic unconsciously behavior not controlled by EF.

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There are numerous situational factors with the capacity to temporarily reduce EF, all of which will have an indirect effect on RF. Factors such as social and environmental factors (e.g. Finkel et al., 2006), alcohol intoxication (Hofmann & Friese, 2008), incomprehensible amounts of stress (Kluwe-Schiavon et al., 2017) and cognitive load (Hofmann, Gschwendner, Castelli & Schmitt, 2008) are all known to have a temporarily negative effect on EF. Individuals who possess lower levels of EF (such as our sample) may be more prone to be affected by these situational factors, as they have little to no buffer concerning EF capacity.

In order to further investigate the idea that the association between EF and RFQu, it would be interesting to assess the same EF as measured in this thesis by administering tasks inducing affective states, thereby obtaining measures of EF in affective states, in order to look at the association between affective EF measures and RFQu.

4.4 Statistical pitfalls

In this section we will cover statistical limitations, the implications of these, and a short discussion concerning some of the statistical decisions made. These issues are covered through a division into two sections, one concerning the RFQ-8 (focusing on the non-significant findings concerning the RFQc) and another concerning the general statistical limitations.

4.4.1 The limitations of RFQ-8 in our analyses

A potential weakness of the RFQ-8 is the overlap between the scales. In our study, this is demonstrated by a strong correlation (-,60 see Table 3) between the scales, which is hardly surprising considering the fact that out of the six items the scales consist of, four are shared. Such a substantial negative correlation between the scales makes it hard to obtain high scores on both RFQ scales. To a certain extent, this is in conflict with Luyten and Fonagy's biobehavioral model, based on Arnsten, Mathew, Ubriani, Taylor and Li (1999) and Mayes' (2000; 2006) research, suggesting that an individual could fall back on either the certain or uncertain prementalizing style, depending on the type of situation, thus being able to score high on both RFQu and RFQc. There are also some clinical examples supporting this claim. One such example is patients diagnosed with borderline personality disorder (BPD), in which the symptoms displayed are considered to be a consequence of the activation of different

prementalizing modes, such as psychic equivalence mode and pretend mode, thereby implying that these patients are exercising both RF styles (Fonagy & Bateman, 2008). However, it should be noted that it is unclear whether the RFQ aims to measure both RF styles within one person, or if it aims to illuminate the dominant reflective style, forcing the individual to choose between the two styles (Luyten & Fonagy, 2017). Either way, due to the high correlation between the scales, a disproportionately large share of the mothers has high scores on RFQu, thus causing few to have high scores on RFQc. This leads to both a low mean score and restricted range of RFQc scores, limiting both the possible significance and correlation with other measures for this scale. Also, the strong negative correlation between the scales makes it hard to separate the findings concerning the scales: to a certain degree, findings concerning low scores on one scale can be explained by high scores on the other, and vice versa. These potential weaknesses will now be systematically investigated to help shed light on the non-significant findings concerning RFQc.

Aim 1: The lack of association between RFQc and the PDI

The variability in scores for RFQu is nearly twice the size of RFQc (comparing their standard deviations), which can therefore explain some of the substantial difference concerning the size of r for the scales. Also, the measure of RFQc were positively skewed, with nearly 35% scoring 0. Nunnally and Bernstein (1994) noted that the effect on the size of r depends on how different the shapes of the distributions are, with different shapes creating a lower r. Because the distribution of PDI is approximately normally distributed (thus differing from RFQc), this would also contribute to an artificially low r between the PDI and the RFQc.

The low mean and restricted variability of scores on RFQc raise a question of whether the occurrence and level of RFQc found in our sample is high enough to measure RF deficits. Low to moderate levels of certain RF seem to be somewhat protective against psychopathology (relating positively to anger control and negatively to trait anger), at least when found in non-clinical samples (Fonagy et al., 2016). However, too high levels of certain RF can lead to rigidity and a collapse of mentalizing (Fonagy et al., 2016; Sharp et al., 2011). It is therefore plausible that the RFQc scores in our sample were not high enough to measure pathological RFQc scores, theorized to be associated with impairments of RF. Our non-significant association between RFQc and maternal RF may therefore reflect limitations in our data, rather than a real lack of association. It would hence be of great interest to

investigate the relationship between RFQc and maternal RF in a sample with both higher levels and a wider range of RFQc to properly assess this relationship. This would potentially reveal unique insights into the potential pathological traits unique to this RF deficit.

Aim 2: The lack of association between RFQc and trauma

Because of the low mean RFQc, the percentage of participants qualifying as having a "high" RFQc score is only 18.6, compared with 55.8 for RFQu (shown in Table 5). Because of the low number of participants in the RFQc-high-group, the statistical power decreases notably, increasing the chances of a type II error (falsely rejecting our hypothesis). Also, for the most part, the few mothers qualifying as having a "high" RFQc score were barely above the cut-off. As mentioned in the last paragraph, most of the RFQc scores in our sample might be low enough to have a protective and adaptive function, instead of a psyhopathological one. A clinical cut-off at 1 might therefore be too low for this scale. To summarize, we cannot conclude whether RFQc is related to trauma in this study because of both the low overall scores on RFQc and a cut-off that might have been too low to capture a pathological RFQc, related to trauma.

Aim 3: The lack of significant associations between EF and RFQc

The same arguments for aim 1 can also be made for aim 3: Both the restricted variability (compared with RFQu) and the positively skewed distribution (which differ significantly in shape compared with the relatively normally distributed EF variables) of the RFQc will create artificially low correlations and standardized regression coefficients in analyses with the EF measures. This will consequently also make the weak trends less significant, which increases the chances of making a type II error.

Correlations between RFQc and EF (although weak and non-significant) were all positive, indicating that a more certain RF style (high RFQc) is associated with higher scores on EF measures. However, because of the high correlation between RFQc and RFQu scores, it is not possible to know which of the scales is responsible for this trend. This trend might just be a byproduct of the low RFQu scores the individuals scoring highly on RFQc generally have.

4.4.2 General limitations

Our sample size restricted the study in several ways. Firstly, it prevented an investigation of the association between different types of trauma and the RFQ scales. We were not able to investigate this because of the problem of multiple comparisons (see section 2.2.4 for further elaboration). It would have been possible to run these analyses with a larger sample, because we then could have corrected for multiple comparisons with, e.g., the Holm-Bonferroni method. Secondly, as noted in section 4.4.1, our data shows a trend in which a more certain RF style might be associated with higher scores on EF. In order to determine whether the small effect sizes presented here are in fact significant, a larger sample size would be necessary.

Another limitation is caused by the type of data collected. The cross-sectional data (data collected at one point in time) we are using can inform us about correlations between the variables we are measuring, but not about causality. The causal relationships we are suggesting (EF being a prerequisite for well-functioning RF and trauma causing impaired mentalizing) are supported by the empirical and theoretical information presented in other studies. Our results, based on both the limited sample size and our correlational data, are to be considered as preliminary and in need of replication. In order to investigate the causal relationships we are suggesting it will be necessary to investigate these relationships in experimental studies. Seeing how this is nearly impossible because of ethical considerations (especially considering trauma), a longitudinal study of the relationships investigated here would be of great interest. Another type of data with limitations used in our analyses is the retrospective data collected using the TAQ, with its scores based on recollections of trauma. Because memory is unreliable and biased, the variables concerning early childhood (0-6) and school age (6-12) in particular are subjects for critique. The lower overall reporting of trauma in these early time periods (see Table 5) might reflect a lack of memory rather than lack of traumatic episodes, thereby making it problematic to draw conclusions concerning trauma and the RFQ scales in these periods.

Both intelligence and mental health were potential confounding variables and were therefore candidates for inclusion in the regression analyses as control variables. The appropriate reason for including control variables is when there is a reason to suspect that the control variable is *causing* the correlation between the independent and dependent variable. For this to be the case, the control variable has to have a causal relationship with the independent variable and be correlated with the dependent variable. In our case, this would entail

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considering the level of mental health and/or intelligence to be likely causes of reflective functioning scores. The control variable should not be an outcome of the dependent or the independent variable. This is likely the case with mental health in our sample because both poor EF (dependent variable) and poor RF (independent variable) increase the chances of developing poor mental health and psychopathology (Katznelson, 2014; Snyder, 2013). Therefore, because both EF and RF may be causal factors in the development of poor mental health, including mental health as a control variable in regression analyses, this may have produced overcorrected, anomalous and counterintuitive findings concerning the relationship between EF and RF. The same case could be made for the inclusion of trauma and substance abuse in these analyses, as poor EF and RF may be causal factors in the prevalence of both trauma and development of SUD (Giancola & Tarter, 1999; Söderström & Skårderud, 2009). The same case cannot be made for intelligence, as there is little to no reason for thinking that EF and RF are causal factors in the development of intelligence, with intelligence being a more primal ability than both EF and RF (Steele & Steele, 2008). Intelligence seems to (at least in some studies) correlate with both RF and EF (see sections 1.2 and 1.3, respectively), and is therefore a potential confounding variable. Based on this reasoning, IQ measures were the only control variable investigated in our analysis, and would have been included in the multivariate analyses if their relationship with EF and RF had been significant in the bivariate analysis.

Neither TAQ nor RFQ have been used extensively in research (Spinazzola et al., 2001), and no well-validated clinical cut-offs have been set (P. Luyten & A. Moulton-Perkins, personal communication, June 2nd, 2017). Therefore, before doing the Fisher's exact test, clinical cut-offs separating the groups had to be chosen by the authors (see sections 2.2.4 and 2.2.2 for a description of these decisions). The cut-offs in our sample are therefore to be considered as preliminary, and may only be used to guide future studies investigating a proper clinical cut-off.

There exists a certain discrepancy between the theories surrounding EF as a construct in regard to whether EF is to be understood as one big, united construct, or are better understood as several independent, but related components (see section 1.3 for a detailed description of this debate). Miyake, Friedman, Emerson, Witzki and Howerter (2000) have attempted to integrate these components into "the unitary and diversity view of EF." Our EF battery tested these components, which all correlated strongly (see Table 9). The size of the correlation

between EF (and in particular the high correlation between WM and inhibition) was sufficient to trigger the investigation of multiple collinearity (see section. 2.5, aim 3, for an elaboration of this concept). The collinearity diagnostic, the variance inflation factor (VIF), indicated that the total amount of shared variance between all the EFs was high. Therefore, based on the high correlations between the EFs and the high average VIF, the unique variance explained by each of the EF in our multivariate analyses is not as reliable as we hoped for. An even greater covariation would be expected if the EF tests were more reliable. This raises the question of whether we really have measures in our study of one overarching construct, or several distinct, but related components. Although our study does not favor any of the models, it is important to also have the "overarching construct" understanding in mind when interpreting the the association between RFQu and EF. As suggested earlier, it is possible that the association between EF and RFQu, at least in part, is explained by the shared important role of all the EF in affect regulation, enabling RF as an affect regulation tool (see section 4.3.1). Taken together, the high shared variance between the EF, and their necessary role in effective affect regulation may suggest that the correlations that each of the EF have with RFQu can also be explained through their shared covariance.

4.5 Clinical implications

The only currently well-validated measures that directly assess RF are both interview-based, the Reflective Functioning Scale (RFS) (Fonagy et al., 1998) applied to the Adult Attachment Interview (AAI) (Main & Golywyn, 1994), and the Parent Development Interview (Slade et al., 2005a) applied to an interview about parenting. However, sample sizes tend to be small, as these interviews are both labor- and time-intensive, and require highly trained raters (Taubner et al., 2013). There is thus a need for a questionnaire that could be used in large-scale epidemiological studies, in which investigations concerning RF are to be examined. For this purpose, the RFQ-8 is a long-awaited supplement in the research field of RF due to its time- and labor-saving qualities as a short self-report questionnaire. This thesis has explored the RFQ-8's association with other related constructs (EF, RF and trauma), and has in this sense contributed to the exploration of the construct validity of the questionnaire. This is much needed based on the fact that this is a new measure with only preliminary evidence for its reliability and validity (Fonagy et al., 2016). Our study finds satisfactory correlations and associations between RFQu and trauma and EF, and therefore contributes to this scale's

validity and usefulness. On the other hand, the RFQc does not correlate in the manner we expected, but because of several limitations (see section 4.4.1), this study does not disclaim its validity or usefulness as a measure of poor mentalizing.

In general, resiliency studies strongly suggest the importance of individually adjusted interventions to address maternal functioning in clinical populations (Luthar, 2006; Rutherford, Booth, Luyten, Bridgett, & Mayes, 2015). In most patients, including in our sample, the activation of automatic dysfunctional prementalizing states in situations evoking stress is central. The ultimate goal of mentalization-based therapy is to increase the ability of true flexible and effortful mentalizing, particularly in the face of stressful situations (Fonagy & Luyten, 2016). Hypermentalizing and hypomentalizing are (as mentioned earlier) two forms of automatic mentalizing, and are challenged and changed through the exploration of alternative ways of viewing the minds of oneself and others, thereby instead engaging in explicit controlled mentalizing. Although it is still too early for the application of the RFQ in clinical settings (Luyten, Fonagy, Lowyck, & Vermote, 2012), administering the RFQ-8 before treatment might be an effective way to screen for a predominant certain or uncertain RF style, and may pinpoint the focus of the mentalization-based treatment. Another potential application of the questionnaire is as a labor- and time-efficient measure of change in therapy that assesses improvement in RF.

Our results show how trauma in adolescence is associated with RFQu. In adolescence, peers progressively play a more important role in the acquisition and development of RF (Caputi et al., 2012). As previously described, trauma in adolescence can lead to social isolation (Chou et al., 2011; Cook et al., 2005) or a seeking out of social interaction with deviant adolescence having experienced similar traumatic experiences. Corrective experiences and feedback are necessary in facilitating the development of RF after a teenage period characterized by trauma (Bateman & Fonagy, 2010). A theoretical efficient way to create a social setting that facilitates this type of corrective experience is group therapy. This could potentially increase both the quality and amount of social interaction with peers. It should, however, be noted that group therapy alone as a mentalization-based treatment has not been sufficiently studied, and an empirical question remains about whether this format can be effective on its own (Karterud & Bateman, 2012).

Based on our results, it might be necessary to improve executive functions (working memory, planning and cognitive flexibility) in order to effectively implement a mentalization-based

therapy successfully if the dominant style of mentalizing is an uncertain one. However, the results of the long-term effectiveness of interventions targeting increased EF are ambiguous, and not always found in follow-up studies (see Melby-Lervåg & Hulme, 2013 for an in-depth review). Our results indicate that RFQc is not significantly associated with a deficiency in EF. On the contrary, there is a trend in our data that suggests the opposite, which may indicate that these individuals are qualified for mentalization-focused therapy without any pre-intervention targeting EF.

4.6 Conclusion

The aim of this thesis was to investigate the association between certain and uncertain RF styles and maternal RF, trauma and EF in mothers with SUD. The uncertain RF style was significantly associated with maternal RF, higher amounts of trauma and trauma experienced in adolescence, as well as the EF cognitive flexibility, WM and planning. We suggest that trauma may impair RF through its adverse effect on the developing brain, and through its effect on interpersonal functioning and relationships. We also suggest that EF may impair RF through the impediment of proper affect regulation. No significant associations were found between the certain RF style and maternal RF, EF and trauma. This is possibly best explained by statistical limitations, and so for this reason we do not draw any conclusions from these findings. Preliminary findings appear promising in regard to the development of the RFQ as a time- and labor-saving RF assessment tool suitable for research on large samples. However, more research is needed to further investigate the validity for this questionnaire and to fully understand the concrete and intricate mechanisms underlying the uncertain and certain RF deficits. This might be especially relevant for the certain RF scale, as to which our findings are inconclusive.

References:

Abate, A., Marshall, K., Sharp, C., & Venta, A. (2017). Trauma and aggression: investigating the mediating role of mentalizing in female and male inpatient adolescents. *Child Psychiatry & Human Development*, 1-10. doi: 10.1007/s10578-017-0711-6.

Aber, J. L., Slade, A., Berger, B., Bresgi, I., & Kaplan, M. (1985). The parent development interview. *Unpublished manuscript*

Allen, J. G. (2003). Mentalizing. *Bulletin of the Menninger Clinic*, *67*(2), 91-112. https://doi.org/10.1521/bumc.67.2.91.23440

Allen, J. G., & Fonagy, P. (Eds.). (2006). *The handbook of mentalization-based treatment*. Chichester: John Wiley & Sons. doi: 10.1002/9780470712986

Allen, J. G., Fonagy, P., & Bateman, A. W. (2008). *Mentalizing in clinical practice*. Washington, DC: American Psychiatric Publishing, Inc.

American Psychiatric Association. (1980). *Diagnostic and statistical Manual of mental disorders* (3rd ed.). Washington, DC: Author.

Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C. H., Perry, B. D., Dube, S. R., & Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood. *European archives of psychiatry and clinical neuroscience*, *256*(3), 174-186. https://doi.org/10.1007/s00406-005-0624-4

Arffa, S. (2007). The relationship of intelligence to executive function and non-executive function measures in a sample of average, above average, and gifted youth. *Archives of Clinical Neuropsychology*, *22*(8), 969-978. https://doi.org/10.1016/j.acn.2007.08.001

Arnsten, A. F., Mathew, R., Ubriani, R., Taylor, J. R., & Li, B. M. (1999). α-1 noradrenergic receptor stimulation impairs prefrontal cortical cognitive function. *Biological psychiatry*, *45*(1), 26-31. https://doi.org/10.1016/S0006-3223(98)00296-0

Baddeley, A. (2003). Working memory: looking back and looking forward. *Nature Reviews Neuroscience*, *4*(10), 829-839. doi:10.1038/nrn1201

Badoud, D., Luyten, P., Fonseca-Pedrero, E., Eliez, S., Fonagy, P., & Debbané, M. (2015). The French Version of the Reflective Functioning Questionnaire: Validity Data for Adolescents and Adults and Its Association with Non-Suicidal Self-Injury. *PLoS One*, *10*(12). https://doi.org/10.1371/journal.pone.0145892

Baldacchino, A. M., Tolomeo, S., Khan, F., Humphris, G. M., & Carra, G. (2016). Acute risk factors in fatal opioid overdoses as a result of hypoxia and cardiotoxicity. A systematic review and critical appraisal. *Heroin Addiction and Related Clinical Problems*, 18(4), 33-42.

Bateman, A., & Fonagy, P. (2010). Mentalization based treatment for borderline personality disorder. *World psychiatry*, *9*(1), 11-15. doi: 10.1002/j.2051-5545.2010.tb00255.x

Beer, J. S., John, O. P., Scabini, D., & Knight, R. T. (2006). Orbitofrontal cortex and social behavior: integrating self-monitoring and emotion-cognition interactions. *Journal of cognitive neuroscience*, *18*(6), 871-879. doi: 10.1162/jocn.2006.18.6.871

Berkman, E. T., Falk, E. B., & Lieberman, M. D. (2011). In the trenches of real-world self-control: neural correlates of breaking the link between craving and smoking. *Psychological Science*, *22*(4), 498-506. https://doi.org/10.1177/0956797611400918

Best, J. R., & Miller, P. H. (2010). A developmental perspective on executive function. *Child development*, *81*(6), 1641-1660. https://doi.org/10.1111/j.1467-8624.2010.01499.x

Bowerman, B. L., & O'connell, R. T. (1990). *Linear statistical models: An applied approach (2nd ed.)*. Belmont, CA: Duxbury Press.

Brady, K. T., Back, S. E., & Coffey, S. F. (2004). Substance abuse and posttraumatic stress disorder. *Current Directions in Psychological Science*, *13*(5), 206-209. https://doi.org/10.1111/j.0963-7214.2004.00309.x

Bradford, E. E., Jentzsch, I., & Gomez, J. C. (2015). From self to social cognition: theory of mind mechanisms and their relation to executive functioning. *Cognition*, *138*, 21-34. https://doi.org/10.1016/j.cognition.2015.02.001

Burns, K. A., Chethik, L., Burns, W. J., & Clark, R. (1997). The early relationship of drug abusing mothers and their infants: An assessment at eight to twelve months of age.

Journal of Clinical Psychology, *53*(3), 279-287. doi: 10.1002/(SICI)1097-4679(199704)53:3<279::AID-JCLP11>3.0.CO;2-F

Callaghan, T., Rochat, P., Lillard, A., Claux, M. L., Odden, H., Itakura, S., Tapanya, S., & Singh, S. (2005). Synchrony in the onset of mental-state reasoning: Evidence from five cultures. *Psychological Science*, *16*(5), 378-384. https://doi.org/10.1111/j.0956-7976.2005.01544.x

Caputi, M., Lecce, S., Pagnin, A., & Banerjee, R. (2012). Longitudinal effects of theory of mind on later peer relations: the role of prosocial behavior. *Developmental psychology*, *48*(1), 257- 270. http://dx.doi.org/10.1037/a0025402

Carlson, S. M., Claxton, L. J., & Moses, L. J. (2015). The relation between executive function and theory of mind is more than skin deep. *Journal of Cognition and Development*, *16*(1), 186-197. http://dx.doi.org/10.1080/15248372.2013.824883

Cash, S. J., & Wilke, D. J. (2003). An ecological model of maternal substance abuse and child neglect: issues, analyses, and recommendations. *American Journal of Orthopsychiatry*, *73*(4), 392-404. http://dx.doi.org/10.1037/0002-9432.73.4.392

Chambers, R. A., Taylor, J. R., & Potenza, M. N. (2003). Developmental neurocircuitry of motivation in adolescence: a critical period of addiction vulnerability. *American Journal of Psychiatry*, *160*(6), 1041-1052. https://doi.org/10.1176/appi.ajp.160.6.1041

Choi-Kain, L. W., & Gunderson, J. G. (2008). Mentalization: ontogeny, assessment, and application in the treatment of borderline personality disorder. *American Journal of Psychiatry*, *165*(9), 1127-1135. https://doi.org/10.1176/appi.ajp.2008.07081360

Chou, K. L., Liang, K., & Sareen, J. (2011). The association between social isolation and DSM-IV mood, anxiety, and substance use disorders: wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions. *The Journal of clinical psychiatry*, *72*(11), 1468-1476. doi: 10.4088/JCP.10m06019gry

Cloitre, M., Tardiff, K., Marzuk, P.M., Leon, A.C., & Portera, L. (2001). Consequences of childhood abuse among male psychiatric inpatients: Dual roles as victims and perpetrators. *Journal of Traumatic Stress*, 14(1), 47–61. doi: 10.1023/A:1007883414776

Cook, A., Spinazzola, J., Ford, J., Lanktree, C., Blaustein, M., Cloitre, M., DeRosa, R., Hubbard, R., Kagan, R., Liautaud, J., Mallah, K., Olafson, E., & van der Kolk, B. (2005). Complex Trauma in Children and Adolescents. *Psychiatric Annals*, *35*(5), 390-398. doi: 10.3928/00485713-20050501-05

Crean, R. D., Crane, N. A., & Mason, B. J. (2011). An evidence based review of acute and long-term effects of cannabis use on executive cognitive functions. *Journal of addiction medicine*, *5*(1), 1-8. doi: 10.1097/ADM.0b013e31820c23fa

Crews, F., He, J., & Hodge, C. (2007). Adolescent cortical development: a critical period of vulnerability for addiction. *Pharmacology Biochemistry and Behavior*, *86*(2), 189-199. https://doi.org/10.1016/j.pbb.2006.12.001

Cuomo, C., Sarchiapone, M., Di Giannantonio, M., Mancini, M., & Roy, A. (2008). Aggression, impulsivity, personality traits, and childhood trauma of prisoners with substance abuse and addiction. *The American journal of drug and alcohol abuse*, *34*(3), 339-345. http://dx.doi.org/10.1080/00952990802010884

Davidson, M. C., Amso, D., Anderson, L. C., & Diamond, A. (2006). Development of cognitive control and executive functions from 4 to 13 years: Evidence from manipulations of memory, inhibition, and task switching. *Neuropsychologia*, *44*(11), 2037-2078. https://doi.org/10.1016/j.neuropsychologia.2006.02.006

Deater- Deckard, K., Wang, Z., Chen, N., & Bell, M. A. (2012). Maternal executive function, harsh parenting, and child conduct problems. *Journal of Child Psychology and Psychiatry*, *53*(10), 1084-1091. doi: 10.1111/j.1469-7610.2012.02582.x

De Bellis, M. D., & Zisk, A. (2014). The Biological Effects of Childhood Trauma. *Child and Adolescent Psychiatric Clinics*, *23*(2), 185-222. doi: 10.1016/j.chc.2014.01.002

DeSocio, J., & Hootman, J. (2004). Children's Mental Health and School Success. *The Journal of School Nursing*, *20*(4), 189-196. https://doi.org/10.1177/10598405040200040201

De Kloet, E. R., Joëls, M., & Holsboer, F. (2005). Stress and the brain: from adaptation to disease. *Nature reviews. Neuroscience*, *6*(6), 463-475. http://dx.doi.org/10.1038/nrn1683

Delis, D. C., Kramer, J. H., Kaplan, E., & Holdnack, J. (2004). Reliability and validity of the Delis-Kaplan Executive Function System: an update. *Journal of the International Neuropsychological Society*, *10*(2), 301-303. doi: 10.10170S1355617704102191

Delis, D. C., Kaplan, E., & Kramer, J. H. (2001). *Delis-Kaplan executive function system (D-KEFS)*. San Antonio, TX: The Psychological Corporation.

Dennis, M., Francis, D. J., Cirino, P. T., Schachar, R., Barnes, M. A., & Fletcher, J. M. (2009). Why IQ is not a covariate in cognitive studies of neurodevelopmental disorders. *Journal of the International Neuropsychological Society*, *15*(3), 331-343. https://doi.org/10.1017/S1355617709090481

Diamond, A. (2002). Normal development of prefrontal cortex from birth to young adulthood: Cognitive functions, anatomy, and biochemistry. In: Stuss, D, & Knight, R (eds.), (2002). *Principles of frontal lobe function*. New York, NY: Oxford University Press, 466-503.

Diamond, A. (2013). Executive functions. *Annual review of psychology*. 64, 135-168. doi: 10.1146/annurev-psych-113011-143750

Dingle, G. A., Cruwys, T., & Frings, D. (2015). Social Identities as Pathways into and out of Addiction. *Frontiers in Psychology*, *6*, 1795. doi: 10.3389/fpsyg.2015.01795

Donders, J., & Kirsch, N. (1991). Nature and implications of selective impairment on the Booklet Category Test and Wisconsin Card Sorting Test. *The Clinical Neuropsychologist*, *5*(1), 78-82. http://dx.doi.org/10.1080/13854049108401844

Dreisbach, G., & Haider, H. (2009). How task representations guide attention: further evidence for the shielding function of task sets. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *35*(2), 477-486. http://dx.doi.org/10.1037/a0014647

Dube, S.R., Anda, R.F., Felitti, V.J., Chapman, D.P., Williamson, D.F., & Giles, W.H. (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: Findings from the Adverse Childhood Experiences Study. *Journal of the American Medical Association*, 286(24), 3089–3096. doi: 10.1001/jama.286.24.3089

Dunn, E. C., Nishimi, K., Powers, A., & Bradley, B. (2017). Is developmental timing of trauma exposure associated with depressive and post-traumatic stress disorder symptoms in adulthood?. *Journal of psychiatric research*, *84*, 119-127. https://doi.org/10.1016/j.jpsychires.2016.09.004

Edwards, V. J., Holden, G. W., Felitti, V. J., & Anda, R. F. (2003). Relationship between multiple forms of childhood maltreatment and adult mental health in community respondents: results from the adverse childhood experiences study. *American Journal of Psychiatry*, *160*(8), 1453-1460. https://doi.org/10.1176/appi.ajp.160.8.1453

Egeland, J. (2015). Measuring working memory with Digit Span and the Letter-Number Sequencing subtests from the WAIS-IV: too low manipulation load and risk for underestimating modality effects. *Applied Neuropsychology: Adult*, *22*(6), 445-451. http://dx.doi.org/10.1080/23279095.2014.992069

Elzinga, B. M., Schmahl, C. G., Vermetten, E., van Dyck, R., & Bremner, J. D. (2003). Higher cortisol levels following exposure to traumatic reminders in abuse-related PTSD. *Neuropsychopharmacology*, *28*(9), 1656- 1665. doi**:** 10.1038/sj.npp.1300226

England-Mason, G., Kimber, M., Khoury, J., Atkinson, L., MacMillan, H., & Gonzalez, A. (2017). Difficulties with emotion regulation moderate the association between childhood history of maltreatment and cortisol reactivity to psychosocial challenge in postpartum women. *Hormones and behavior*, 95, 44-56. https://doi.org/10.1016/j.yhbeh.2017.07.007

Ensink, K., & Mayes, L. C. (2010). The development of mentalisation in children from a theory of mind perspective. *Psychoanalytic Inquiry*, *30*(4), 301-337. http://dx.doi.org/10.1080/23279095.2014.992069

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American journal of preventive medicine*, *14*(4), 245-258. https://doi.org/10.1016/S0749-3797(98)00017-8

Fewell CH. Using a mentalization-based framework to assist hard-to-reach clients in

individual treatment. In: Bennet, S, Nelson J.K., (eds) (2010). *Adult attachment in Clinical Social Work, practice, research, and policy* (pp. 113–126). New York, NY: Springer-Verlag. https://doi.org/10.1007/978-1-4419-6241-6_7

Field, A. (2009). *Discovering statistics using SPSS* (pp. 723-724). London: Sage publications. doi: 10.1002/bjs.7040

Finkel, E. J., Campbell, W. K., Brunell, A. B., Dalton, A. N., Scarbeck, S. J., & Chartrand, T. L. (2006). High-maintenance interaction: inefficient social coordination impairs self-regulation. *Journal of personality and social psychology*, *91*(3), 456-475. http://dx.doi.org/10.1037/0022-3514.91.3.456

Fishbach, A., Zhang, Y., & Koo, M. (2009). The dynamics of self-regulation. *European Review of Social Psychology*, *20*(1), 315-344. http://dx.doi.org/10.1080/10463280903275375

Fonagy, P. (2006). The mentalization-focused approach to social development. In: Allen, G., & Fonagy, P. (2006) *Handbook of mentalization-based treatment* (pp. 53-100). Chichester: John Wiley & Sons. doi: 10.1002/9780470712986.

Fonagy, P., & Bateman, A. (2008). The development of borderline personality disorder—A mentalizing model. *Journal of personality disorders*, *22*(1), 4-21. https://doi.org/10.1521/pedi.2008.22.1.4

Fonagy, P., Gergely, G., Jurist, E. L., & Target, M. (Eds.). (2004). *Affect regulation, mentalization and the development of the self*. London: Karnac books.

Fonagy, P., & Luyten, P. (2016). A multilevel perspective on the development of borderline personality disorder. In: Cicchetti, D (edi) (2016). *Developmental psychopathology. Vol 3: Maladaptation and psychopathology (*pp. 726–92). New York: John Wiley & Sons. doi: 10.1002/9781119125556.devpsy317

Fonagy, P., Luyten, P., Moulton-Perkins, A., Lee, Y. W., Warren, F., Howard, S., Ghinai, R., Fearon, P., & Lowyck, B. (2016). Development and validation of a self-report measure of mentalizing: The reflective functioning questionnaire. https://doi.org/10.1371/journal.pone.0158678.

Fonagy, P., & Target, M. (1996). Playing with reality: I. *The International journal of psycho-analysis*, *77*(2), 217- 233.

Fonagy, P., Target, M., Steele, H., & Steele, M. (1998). Reflective functioning scale manual. *Unpublished manuscript, London*.

Friedman, N. P., Miyake, A., Altamirano, L. J., Corley, R. P., Young, S. E., Rhea, S. A., & Hewitt, J. K. (2016). Stability and change in executive function abilities from late adolescence to early adulthood: A longitudinal twin study. *Developmental psychology*, *52*(2), 326- 340. http://dx.doi.org/10.1037/dev0000075

Friedman, N. P., & Miyake, A. (2017). Unity and diversity of executive functions: Individual differences as a window on cognitive structure. *Cortex*, *86*, 186-204. https://doi.org/10.1016/j.cortex.2016.04.023

Frodl, T., & O'Keane, V. (2013). How does the brain deal with cumulative stress? A review with focus on developmental stress, HPA axis function and hippocampal structure in humans. *Neurobiology of disease*, *52*, 24-37. https://doi.org/10.1016/j.nbd.2012.03.012

Garland, E. L., Pettus-Davis, C., & Howard, M. O. (2013). Self-medication among traumatized youth: structural equation modeling of pathways between trauma history, substance misuse, and psychological distress. *Journal of behavioral medicine*, *36*(2), 175-185. doi: 10.1007/s10865-012-9413-5

Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: a review using an integrative framework. *Psychological bulletin*, *134*(1), 31-60. doi: 10.1037/0033-2909.134.1.31

Gershuny, B. S., Najavits, L. M., Wood, P. K., & Heppner, M. (2004). Relation between trauma and psychopathology: Mediating roles of dissociation and fears about death and control. *Journal of trauma & dissociation*, *5*(3), 101-117. http://dx.doi.org/10.1300/J229v05n03_08

Giancola, P. R., & Tarter, R. E. (1999). Executive cognitive functioning and risk for substance abuse. *Psychological Science*, *10*(3), 203-205. https://doi.org/10.1111/1467-9280.00135

Goschke, T. (2003) Voluntary action and cognitive control from a cognitive neuroscience perspective. In: Maasen, S. E., Prinz, W. E., & Roth, G. E. (Eds.) (2003). *Voluntary Action: Brains, Minds, and Sociality* (pp. 49–85). New York, NY: Oxford University Press

Gupta, R., Kar, B. R., & Srinivasan, N. (2009). Development of task switching and post-error-slowing in children. *Behavioral and Brain Functions*, *5*(1), 38. https://doi.org/10.1186/1744-9081-5-38

Hans, S. L., Bernstein, V. J., & Henson, L. G. (1999). The role of psychopathology in the parenting of drug-dependent women. *Development and Psychopathology*, *11*(4), 957-977. http://dx.doi.org/10.1017/S0954579499002400

Heilman, R. M., Crişan, L. G., Houser, D., Miclea, M., & Miu, A. C. (2010). Emotion regulation and decision making under risk and uncertainty. *Emotion*, *10*(2), 257- 265. http://dx.doi.org/10.1037/a0018489

Heim, C., Newport, D. J., Mletzko, T., Miller, A. H., & Nemeroff, C. B. (2008). The link between childhood trauma and depression: insights from HPA axis studies in humans. *Psychoneuroendocrinology*, *33*(6), 693-710. https://doi.org/10.1016/j.psyneuen.2008.03.008

Hien, D., Cohen, L., & Campbell, A. (2005). Is traumatic stress a vulnerability factor for women with substance use disorders?. *Clinical Psychology Review*, *25*(6), 813-823. https://doi.org/10.1016/j.cpr.2005.05.006

Hofmann, W., & Friese, M. (2008). Impulses got the better of me: alcohol moderates the influence of implicit attitudes toward food cues on eating behavior. *Journal of abnormal psychology*, *117*(2), 420-427. http://dx.doi.org/10.1037/0021-843X.117.2.420

Hofmann, W., Gschwendner, T., Castelli, L., & Schmitt, M. (2008). Implicit and explicit attitudes and interracial interaction: The moderating role of situationally available control resources. *Group Processes & Intergroup Relations*, *11*(1), 69-87. https://doi.org/10.1177/1368430207084847

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

Homack, S., Lee, D., & Riccio, C. A. (2005). Test review: Delis-Kaplan executive function system. *Journal of clinical and experimental neuropsychology*, *27*(5), 599-609. http://dx.doi.org/10.1080/13803390490918444

Howitt, D., & Cramer, D. (2011). *Introduction to statistics in psychology* (5th ed.) (pp. 152-171). Harlow: Prentice Hall.

Huber, A., McMahon, C. A., & Sweller, N. (2015). Efficacy of the 20-week circle of security intervention: changes in caregiver reflective functioning, representations, and child attachment in an Australian clinical sample. *Infant mental health journal*, *36*(6), 556-574. doi: 10.1002/imhj.21540.

Hudson, K. D., & Farran, E. K. (2011). Executive function and motor planning. In: Farran, E. K., & Karmiloff-Smith, A. (Eds.) (2011). *Neurodevelopmental disorders across the lifespan: A neuroconstructivist approach* (pp.165-181). New York, NY: Oxford University Press. doi: 10.1093/acprof:oso/9780199594818.001.0001

Håkansson, U., Halsa, 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*, *9*(2), 93-98. doi: 10.4137/SART.S23502

Håkansson, U., Söderström, K., Watten, R., Skårderud, F., & Øie, M, G. (2017). *Executive functioning is associated with parental reflective functioning in infant mothers with Substance Use Disorder.* Manuscript submitted for publication.

Jessee, A., Mangelsdorf, S. C., Wong, M. S., Schoppe-Sullivan, S. J., & Brown, G. L. (2016). Structure of reflective functioning and adult attachment scales: overlap and distinctions. *Attachment & human development*, *18*(2), 176-187. http://dx.doi.org/10.1080/14616734.2015.1132240

Johnstone, B., Holland, D., & Larimore, C. (2000). Language and academic abilities. In: Groth-Marnat, G. (Ed.) (2000). *Neuropsychological assessment in clinical practice: A guide to test interpretation and integration* (pp. 335-354). New York: NY.

Karterud, S., & Bateman, A. W. (2012). Chapter 4: Group therapy techniques . In: Bateman, A. W., & Fonagy, P (eds.) (2012). *Handbook of mentalizing in mental health practice.* Washington, DC: American Psychiatric Publishing.

Katznelson, H. (2014). Reflective functioning: A review. *Clinical Psychology Review*, *34*(2), 107-117. https://doi.org/10.1016/j.cpr.2013.12.003

Kessler, F., Cacciola, J., Alterman, A., Faller, S., Souza-Formigoni, M. L., Cruz, M. S., Brasiliano, S., & Pechansky, F. (2012). Psychometric properties of the sixth version of the Addiction Severity Index (ASI-6) in Brazil. *Revista Brasileira de Psiquiatria, 34*(1), 24-33. https://doi.org/10.1590/S1516-44462012000100006

Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of general psychiatry*, *52*(12), 1048-1060. doi:10.1001/archpsyc.1995.03950240066012.

Khoury, L., Tang, Y. L., Bradley, B., Cubells, J. F., & Ressler, K. J. (2010). Substance use, childhood traumatic experience, and posttraumatic stress disorder in an urban civilian population. *Depression and anxiety*, *27*(12), 1077-1086. doi: 10.1002/da.20751

Kluwe-Schiavon, B., Viola, T. W., Sanvicente-Vieira, B., Malloy-Diniz, L. F., & Grassi-Oliveira, R. (2016). Balancing Automatic-Controlled Behaviors and Emotional-Salience States: A Dynamic Executive Functioning Hypothesis. *Frontiers in psychology*, *7*, 2067. doi: 10.3389/fpsyg.2016.02067

Knudsen, E. I. (2007). Fundamental Components of Attention. *Annual Review of Neuroscience*, *30*, 57-78.

Kokkevi, A., & Hartgers, C. (1995). EuropASI: European adaptation of a multidimensional assessment instrument for drug and alcohol dependence. *European addiction research*, *1*(4), 208-210. doi:10.1159/000259089

Kolb, B., Mychasiuk, R., Muhammad, A., Li, Y., Frost, D. O., & Gibb, R. (2012). Experience and the developing prefrontal cortex. *Proceedings of the National Academy of Sciences of the United States of America*, *109*(2), 17186-17193. doi:10.1073/pnas.1121251109

Koob, G., & Kreek, M. J. (2007). Stress, dysregulation of drug reward pathways, and the transition to drug dependence. *American Journal of Psychiatry*, *164*(8), 1149-1159. https://doi.org/10.1176/appi.ajp.2007.05030503

Lauritzen, G. (2010). European Addiction Severity Index (EuropASI) in a follow-up-study of drug-users in treatment. Reflections on the instrument for research and praxis. SIRUS-Report 6/2010. *Oslo: Statens institutt for rusmiddelforskning (SIRUS)*

Levy, & Truman. (2002). *Reflective functioning as mediator between drug use, parenting stress and child behavior.* Paper presented at the College on Problems of Drug Dependence Annual Meeting, Quebec City, Canada.

Loring, D., W. (2015). *INS dictionary of neuropsychology & clinical neuroscience*. New York, NY: Oxford University Press.

Luthar, S. S. (2006). Resilience in Development: A Synthesis of Research across Five Decades. In: Cicchetti, D., & Cohen, D. J. (Eds.) (2006). *Developmental psychopathology: Risk, disorder, and adaptation* (pp. 739-795). *Hoboken, NJ: John Wiley. doi: 10.1002/9780470939406.ch20*

Luyten, P., & Fonagy, P. (2015). The neurobiology of mentalizing. *Personality Disorders: Theory, Research, and Treatment*, *6*(4), 366-379. doi: 10.1037/per0000117

Luyten, P., & Fonagy, P (2017). *The Reflective Functioning Questionnaire (RFQ).* Retrieved from: http://.www.ucl.ac.uk/psychoanalysis/research/rfq 13.09.2017

Luyten P., Fonagy P., Lowyck B., Vermote R. (2012). Assessment of mentalization. In: Bademan, A. W., & Fonagy, P. (Eds.) (2012). *Handbook of Mentalizing in Mental Health Practice* (pp. 43–65). Washington, DC: American Psychiatric Publishing.

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

Luxenberg, T., Spinazzola, J., & Van der Kolk, B. A. (2001). Complex trauma and disorders of extreme stress (DESNOS) diagnosis, part one: Assessment. *Directions in psychiatry*, *21*(25), 373-392.

Main, M., & Goldwyn, R. (1994). Adult attachment rating and classification system, manual in draft, version 6.0. *Unpublished manuscript, University of California at Berkeley*.

Margolin, G., & Gordis, E. B. (2000). The effects of family and community violence on children. *Annual review of psychology*, *51*(1), 445-479. http://dx.doi.org/10.1146/annurev.psych.51.1.445

Marien, H., Aarts, H., & Custers, R. (2012). Being flexible or rigid in goal-directed behavior: When positive affect implicitly motivates the pursuit of goals or means. *Journal of Experimental Social Psychology*, *48*(1), 277-283. https://doi.org/10.1016/j.jesp.2011.08.013

Martin-Fardon, R., Zorrilla, E. P., Ciccocioppo, R., & Weiss, F. (2010). Role of innate and drug-induced dysregulation of brain stress and arousal systems in addiction: Focus on corticotropin-releasing factor, nociceptin/orphanin FQ, and orexin/hypocretin. *Brain research*, *1314*, 145-161. https://doi.org/10.1016/j.brainres.2009.12.027

Marusak, H. A., Martin, K. R., Etkin, A., & Thomason, M. E. (2015). Childhood trauma exposure disrupts the automatic regulation of emotional processing. *Neuropsychopharmacology*, *40*(5), 1250. doi: 10.1038/npp.2014.311

Mayes, L. C. (2000). A developmental perspective on the regulation of arousal states. *Seminars in perinatology,* 24 (4), 267-279. https://doi.org/10.1053/sper.2000.9121

Mayes, L. C. (2006). Arousal regulation, emotional flexibility, medial amygdala function, and the impact of early experience. *Annals of the New York Academy of Sciences*, *1094*(1), 178-192. doi**:** 10.1196/annals.1376.018

Mayes, L., & Truman, S. (2002). Substance abuse and parenting. In: Bornstein, M., H. (ed.) (2002). *Handbook of parenting: volume 4: social conditions and applied parenting* (pp. 329-359). Mahwah, New Jersey: Lawrence Erlbaum Associates. https://doi.org/10.4324/9781410612168

Mccalla, A. (2013). Executive Functioning – Where is it Controlled and How Does it
Develop? / Remediation Techniques for Deficits and Dysfunction. *RainbowVisions,
Summer 2013, X No.2.* Retrieved from http://www.rainbowrehab.com/executive-
functioning/#attachment%20wp-att-6197/0/ 17.9.2017

McLellan, A. T., Kushner, H., Metzger, D., Peters, R., Smith, I., Grissom, G., Pettinati, H., &
Argeriou, M. (1992). The fifth edition of the Addiction Severity Index. *Journal of
Substance Abuse Treatment, 9*(3), 199-213. https://doi.org/10.1016/0740-
5472(92)90062-S

Melby-Lervåg, M., & Hulme, C. (2013). Is working memory training effective? A meta-
analytic review. *Developmental psychology*, *49*(2), 270-291.
http://dx.doi.org/10.1037/a0028228

Mersky, J. P., Topitzes, J., & Reynolds, A. J. (2013). Impacts of adverse childhood
experiences on health, mental health, and substance use in early adulthood: A cohort
study of an urban, minority sample in the US. *Child abuse & neglect*, *37*(11), 917-925.
https://doi.org/10.1016/j.chiabu.2013.07.011

Miller, G. E., Chen, E., & Zhou, E. S. (2007). If it goes up, must it come down? Chronic
stress and the hypothalamic-pituitary-adrenocortical axis in humans. *Psychological
Bulletin, 133*(1), 25-45. http://dx.doi.org/10.1037/0033-2909.133.1.25

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*. *41(1),
49-100.* https://doi.org/10.1006/cogp.1999.0734

Miyake, A., & Friedman, N. P. (2012). The nature and organization of individual differences
in executive functions: Four general conclusions. *Current directions in psychological
science*, *21*(1), 8-14. https://doi.org/10.1177/0963721411429458

Mordal, J., Gundersen, Ø., & Bramness, J. G. (2010). Norwegian version of the Mini-
International Neuropsychiatric Interview: feasibility, acceptability and test-retest
reliability in an acute psychiatric ward. *European Psychiatry*, 25(3), 172-177.
https://doi.org/10.1016/j.eurpsy.2009.02.004

Moulton-Perkins, A., Rogoff, S., Fonagy, P., & Luyten, P. (2011). Development and validation of a new self-report measure of mentalization: The 54-item Reflective Functioning Questionnaire. unpublished paper presented at the research conference of the British Association for Counselling & Psychotherapy. Retrieved through: http://www.bacp.co.uk/research/conf_archive/2011.php 19.9.2017

Neger, E. N., & Prinz, R. J. (2015). Interventions to address parenting and parental substance abuse: Conceptual and methodological considerations. *Clinical psychology review*, *39*, 71-82. https://doi.org/10.1016/j.cpr.2015.04.004

Nesse, R. M., Bhatnagar, S., & Ellis, B. (2016). Evolutionary Origins and Functions of the Stress Response System. In: Fink, G. (Ed.) (2016). *Handbook of Stress* (pp. 95-101). Amsterdam: Academic Press, 95-100. https://doi.org/10.1016/b978-0-12-800951-2.00011-x

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.

Pajulo, M., 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*, *33*(1), 70-81. doi**:** 10.1002/imhj.20342

Pajulo, M., Suchman, N., Kalland, M., & Mayes, L. (2006). Enhancing the effectiveness of residential treatment for substance abusing pregnant and parenting women: Focus on maternal reflective functioning and mother- child relationship. *Infant Mental Health Journal*, *27*(5), 448-465. doi: 10.1002/imhj.20100

Pattinson, K. T., & Wise, R. G. (2016). Imaging the respiratory effects of opioids in the human brain. In: Roach, R. C., Hackett, P. H., & Wagner, P. D. (eds.) (2016). *Hypoxia: Translation in Progress* (pp. 145-156). New York, NY: Springer Nature. https://doi.org/10.1007/978-1-4899-7678-9_10

Powell, L. J., & Carey, S. (2017). Executive function depletion in children and its impact on theory of mind. *Cognition*, *164*, 150-162. https://doi.org/10.1016/j.cognition.2017.03.022

Preißler, S., Dziobek, I., Ritter, K., Heekeren, H. R., & Roepke, S. (2010). Social cognition in borderline personality disorder: evidence for disturbed recognition of the emotions, thoughts, and intentions of others. *Frontiers in behavioral neuroscience*, 4(182). doi: 10.3389/fnbeh.2010.00182

Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind?. *Behavioral and brain sciences*, *1*(4), 515-526. https://doi.org/10.1017/S0140525X00076512

Ratti, M. T., Bo, P., Giardini, A., & Soragna, D. (2002). Chronic alcoholism and the frontal lobe: which executive functions are imparied?. *Acta Neurologica Scandinavica*, *105*(4), 276-281. doi: 10.1034/j.1600-0404.2002.0o315.x

Rich, S. L., Wilson, J. K., & Robertson, A. A. (2016). The impact of abuse trauma on alcohol and drug use: a study of high-risk incarcerated girls. *Journal of child & adolescent substance abuse*, *25*(3), 194-205. http://dx.doi.org/10.1080/1067828X.2015.1007197

Ritter, K., Dziobek, I., Preißler, S., Rüter, A., Vater, A., Fydrich, T., Lammers, C., Heekeren H, R., & Roepke, S. (2011). Lack of empathy in patients with narcissistic personality disorder. *Psychiatry research*, *187*(1), 241-247. https://doi.org/10.1016/j.psychres.2010.09.013

Rutherford, H. J., Booth, C. R., Luyten, P., Bridgett, D. J., & Mayes, L. C. (2015). Investigating the association between parental reflective functioning and distress tolerance in motherhood. *Infant Behavior and Development*, *40*, 54-63. https://doi.org/10.1016/j.infbeh.2015.04.005

Rutherford, H. J., Goldberg, B., Luyten, P., Bridgett, D. J., & Mayes, L. C. (2013). Parental reflective functioning is associated with tolerance of infant distress but not general distress: evidence for a specific relationship using a simulated baby paradigm. *Infant behavior & development*, *36*(4), 635-641. https://doi.org/10.1016/j.infbeh.2013.06.008

Sabbagh, M. A., Xu, F., Carlson, S. M., Moses, L. J., & Lee, K. (2006). The development of executive functioning and theory of mind: A comparison of Chinese and US preschoolers. *Psychological science*, *17*(1), 74-81. https://doi.org/10.1111/j.1467-9280.2005.01667.x

Schauer, M., & Elbert, T. (2015). Dissociation following traumatic stress. *Zeitschrift für Psychologie/Journal of Psychology*, *218*(2), 109-127. https://doi.org/10.1027/0044-3409/a000018

Schechter, D. S. (2003). Understanding the Interplay of Reflective Functioning and Posttraumatic Psychopathology. In: Coates, S.W., Rosenthal, J.L., & Schechter, D.S., (eds) (2003). *September 11: trauma and human bonds.* Hillsdale, NJ: The Analytic Press, Inc., Publishers. https://doi.org/10.4324/9780203780527

Selemon, L. D. (2013). A role for synaptic plasticity in the adolescent development of executive function. *Translational psychiatry*, *3*(3), e238. doi: 10.1038/tp.2013.7

Sharp, C., Pane, H., Ha, C., Venta, A., Patel, A. B., Sturek, J., & Fonagy, P. (2011). Theory of mind and emotion regulation difficulties in adolescents with borderline traits. *Journal of the American Academy of Child & Adolescent Psychiatry*, *50*(6), 563-573. https://doi.org/10.1016/j.jaac.2011.01.017

Sheehan, D. V., Janavs, J., Baker, R., Sheehan, K. H., Knapp, E. and Sheehan, M. (2006). *Mini International Neuropsychiatric Interview (M.I.N.I.): English version 5.0.0., DSM-IV.* Tampa, FL: University of South Florida.

Sheinberg, M., & True, F. (2008). Treating family relational trauma: A recursive process using a decision dialogue. *Family Process*, *47*(2), 173-195. doi: 10.1111/j.1545-5300.2008.00247.x

Sherin, J. E., & Nemeroff, C. B. (2011). Post-traumatic stress disorder: the neurobiological impact of psychological trauma. *Dialogues in clinical neuroscience*, *13*(3), 263- 278.

Siqveland, T. S., Haabrekke, K., Wentzel-Larsen, T., & Moe, V. (2014). Patterns of mother–infant interaction from 3 to 12 months among dyads with substance abuse and psychiatric problems. Infant Behavior and Development, 37(4), 772-786. https://doi.org/10.1016/j.infbeh.2014.09.003

Siqveland, T., Smith, L., & Moe, V. (2012). The impact of optimality on maternal sensitivity in mothers with substance abuse and psychiatric problems and their infants at 3 months. *Infant Behavior and Development*, *35*(1), 60-70. https://doi.org/10.1016/j.infbeh.2011.09.004

Siqveland, T. S., & Moe, V. (2014). Longitudinal Development of Mother–Infant Interaction During the First Year of Life Among Mothers with Substance Abuse and Psychiatric Problems and Their Infants. *Child Psychiatry & Human Development*, *45*(4), 408-421. doi: 10.1007/s10578-013-0411-9.

Slade, A. (2005). Parental reflective functioning: An introduction. *Attachment & human development*, *7*(3), 269-28. http://dx.doi.org/10.1080/14616730500245906

Slade, A., Bernbach, E., Grienenberger, J., Levy, D., & Locker, A. (2005a). Addendum to reflective functioning scoring manual. *Unpublished manuscript: The Psychological Center, The City College of New York, New York*.

Slade, A., Grienenberger, J., Bernbach, E., Levy, D., & Locker, A. (2005b). Maternal reflective functioning, attachment, and the transmission gap: A preliminary study. *Attachment & Human Devlopment*, *7*(3), 283-298. https://doi.org/10.1080/14616730500245880

Snyder, H. R. (2013). Major depressive disorder is associated with broad impairments on neuropsychological measures of executive function: a meta-analysis and review. *Psychological bulletin*, *139*(1), 81-132. https://doi.org/10.1037/a0028727

Solbakken, B., & Lauritzen, G. (2006). *Tilbud til barn av foreldre med rusmiddelproblemer*. Oslo: SIRUS

Solis, J. M., Shadur, J. M., Burns, A. R., & Hussong, A. M. (2012). Understanding the Diverse Needs of Children whose Parents Abuse Substances. *Current drug abuse reviews*, *5*(2), 135-147. https://doi.org/10.2174/1874473711205020135

Spinazzola, J., Blaustein, M., Kisiel, C., & van der Kolk, B. *Beyond PTSD: Further evidence for a complex adaptational response to traumatic life events*. Paper presented at the American Psychiatric Association Annual Meeting, May, 2001, New Orleans.

Stephens, M. A. C., & Wand, G. (2012). Stress and the HPA axis: role of glucocorticoids in alcohol dependence. *Alcohol research: current reviews*, *34*(4), 468-483.

Steele, H., & Steele, M. (2008). On the origins of reflective functioning. In: Busch, F. N. (Edi.) (2008). *Mentalization: Theoretical considerations, research findings, and clinical implications* (pp.133-158). New York, NY: The Analytic Press.

Stern, D. N. (1985). *The interpersonal world of the infant: A view from psychoanalysis and developmental psychology.* New York: Basic Books.

Stien, P., & Kendall, J. C. (2004). *Psychological trauma and the developing brain: Neurologically based interventions for troubled children*. New york, NY: Routledge. https://doi.org/10.4324/9781315808888

Stuss, D. T., & Levine, B. (2002). Adult clinical neuropsychology: lessons from studies of the frontal lobes. *Annual review of psychology*, *53*(1), 401-433. http://dx.doi.org/10.1146/annurev.psych.53.100901.135220

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 & human development*, *12*(6), 567-585. http://dx.doi.org/10.1080/14616734.2010.501988

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*, *27*(3), 179-185. https://doi.org/10.1016/j.jsat.2004.06.008

Suchman, N. E., McMahon, T. J., Slade, A., & Luthar, S. S. (2005). How Early Bonding, Depression, Illicit Drug Use, and Perceived Support Work Together to Influence Drug- Dependent Mothers' Caregiving. *American Journal of Orthopsychiatry*, *75*(3), 431-445. doi: 10.1037/0002-9432.75.3.431

Suchman, N. E., Ordway, M. R., de las Heras, L., & McMahon, T. J. (2016). Mothering from the Inside Out: results of a pilot study testing a mentalization-based therapy for mothers enrolled in mental health services. *Attachment & human development*, *18*(6), 596-617. http://dx.doi.org/10.1080/14616734.2016.1226371

Swain, J. E., Kim, P., Spicer, J., Ho, S. S., Dayton, C. J., Elmadih, A., & Abel, K. M. (2014). Approaching the biology of human parental attachment: Brain imaging, oxytocin and

coordinated assessments of mothers and fathers. *Brain Research*, *1580*, 78-101.
https://doi.org/10.1016/j.brainres.2014.03.007

Söderström, K., & Skårderud, F. (2009). Minding the baby. Mentalization-based treatment in
families with parental substance use disorder: Theoretical framework. *Nordic
Psychology*, *61*(3), 47-65. http://dx.doi.org/10.1027/1901-2276.61.3.47

Taplin, C., Saddichha, S., Li, K., & Krausz, M. R. (2014). Family history of alcohol and drug
abuse, childhood trauma, and age of first drug injection. *Substance use & misuse*,
49(10), 1311-1316. http://dx.doi.org/10.3109/10826084.2014.901383

Tarullo, A. R., & Gunnar, M. R. (2006). Child maltreatment and the developing HPA axis.
Hormones and behavior, *50*(4), 632-639. https://doi.org/10.1016/j.yhbeh.2006.06.010

Taubner, S., Hörz, S., Fischer-Kern, M., Doering, S., Buchheim, A., & Zimmermann, J.
(2013). Internal structure of the Reflective Functioning Scale. *Psychological
assessment*, *25*(1), 127-135. http://dx.doi.org/10.1037/a0029138.

Taubner, S., White, L. O., Zimmermann, J., Fonagy, P., & Nolte, T. (2013). Attachment-
related mentalization moderates the relationship between psychopathic traits and
proactive aggression in adolescence. *Journal of abnormal child psychology*, *41*(6),
929-938. https://doi.org/10.1007/s10802-013-9736-x

Van der Kolk, B., A. (1997). The Traumatic Antecedents Questionnaire. Brookline, MA: The
Trauma Centre.

Van der Kolk, B. A. (2003). *Psychological trauma*. Washington, DC: American Psychiatric
Publishing.

Van der Kolk, B. A., Roth, S., Pelcovitz, D., Sunday, S., & Spinazzola, J. (2005). Disorders of
extreme stress: The empirical foundation of a complex adaptation to trauma. *Journal
of traumatic stress*, *18*(5), 389-399. doi: 10.1002/jts.20047

Van Schie, C. C., van Harmelen, A. L., Hauber, K., Boon, A., Crone, E. A., & Elzinga, B. M.
(2017). The neural correlates of childhood maltreatment and the ability to understand
mental states of others. *European journal of psychotraumatology*, *8*(1).
http://dx.doi.org/10.1080/20008198.2016.1272788

Von Hippel, W., & Gonsalkorale, K. (2005). "That is bloody revolting!" Inhibitory control of thoughts better left unsaid. *Psychological Science*, *16*(7), 497-500. https://doi.org/10.1111/j.0956-7976.2005.01563.x

Walsh, C., MacMillan, H. L., & Jamieson, E. (2003). The relationship between parental substance abuse and child maltreatment: findings from the Ontario Health Supplement. *Child abuse & neglect*, *27*(12), 1409-1425. https://doi.org/10.1016/j.chiabu.2003.07.002

Watt, M. J., Weber, M. A., Davies, S. R., & Forster, G. L. (2017). Impact of juvenile chronic stress on adult cortico-accumbal function: implications for cognition and addiction. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *79*, 136-154. https://doi.org/10.1016/j.pnpbp.2017.06.015

Wechsler, D. (2008). Wechsler adult intelligence scale–Fourth Edition (WAIS–IV). *San Antonio, TX: NCS Pearson*, *22*, 498.

Wolf, E. J., Miller, M. W., Kilpatrick, D., Resnick, H. S., Badour, C. L., Marx, B. P., Keane, T. M., Rosen, R. C., & Friedman, M. J. (2015). ICD–11 complex PTSD in US national and veteran samples: Prevalence and structural associations with PTSD. *Clinical Psychological Science*, *3*(2), 215-229. https://doi.org/10.1177/2167702614545480

World Health Organization. Management of Substance Abuse Unit. (2014). *Global status report on alcohol and health, 2014*. Geneva, Switzerland: World Health Organization

Yu, R. (2016). Stress potentiates decision biases: A stress induced deliberation-to-intuition (SIDI) model. *Neurobiology of stress*, *3*, 83-95. https://doi.org/10.1016/j.ynstr.2015.12.006

Yuan, P., & Raz, N. (2014). Prefrontal cortex and executive functions in healthy adults: a meta-analysis of structural neuroimaging studies. *Neuroscience & Biobehavioral Reviews*, *42*, 180-192. https://doi.org/10.1016/j.neubiorev.2014.02.005

Zelazo, P. D. (2015). Executive function: Reflection, iterative reprocessing, complexity, and the developing brain. *Developmental Review*, *38*, 55-68. https://doi.org/10.1016/j.dr.2015.07.001

Zimmer-Gembeck, M. J., & Skinner, E. A. (2011). The development of coping across childhood and adolescence: An integrative review and critique of research. *International Journal of Behavioral Development*, *35*(1), 1-17. https://doi.org/10.1177/0165025410384923