Exploration of parental reflective function and mother-child interaction in a South African sample of women with peri- and postpartum psychosis

by

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Dissertation presented for the degree of Doctor of Philosophy in the

Faculty of Medical and Health Sciences, at Stellenbosch University

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December 2020

Declaration

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August 2020

Abstract

Background:

Severe mental illness in the peripartum period may exert a significant and detrimental impact on maternal caregiving and infant attachment. The experience of psychotic symptoms during pregnancy or the postpartum period may further contribute to the development of attachment difficulties and poor outcomes. Attachment theory was used as a guiding framework to examine the experience and impact of peripartum psychosis on the mother-infant dyad. Infants of mothers with psychosis are at risk of developing insecure or disorganised attachment. Mothers with psychotic disorders are likely to display poor sensitivity and responsiveness in interaction with their infants. Parental reflective functioning (PRF) is the capacity to hold in mind one's own and one's child's mental states. Impairments in PRF may be a potential mechanism for impairments in attachment and quality of mother-infant interaction. Peripartum psychosis may place the mother-infant dyad at risk due to the nature of symptoms, the frequent need for psychiatric admission and separation between mother and infant. Studies of maternal psychopathology and infant outcomes in South Africa have focussed on maternal depression or trauma. To our knowledge, there are no studies examining the impact of maternal psychosis on parenting in South Africa. There have been limited studies examining PRF in South Africa; however, none have focussed specifically on how this capacity influences caregiving behaviours among mothers who have experienced psychosis in the peripartum.

This study set out to explore PRF and quality of mother-infant interaction in a sample of mothers with peripartum psychosis. We hypothesised that experiences of peripartum psychosis will be associated with 1) lower PRF and 2) poorer quality of mother-infant interaction. Further, we hypothesised that 3) impairments in PRF will be correlated with a poorer quality of mother-infant interaction.

Methods:

The study followed an exploratory, quantitative and descriptive design. Forty mothers with predominantly bipolar disorder or schizophrenia were recruited following experiences of psychosis during pregnancy or early postpartum in order to determine their level of PRF and quality of interaction with their infants. A detailed interview was conducted to obtain information pertaining to demographic and clinical characteristics, as well as pregnancy and postpartum experiences. PRF was coded from the Parent Development Interview and the quality of interaction was assessed following

an unstructured play interaction between mother and infant. Two-sample *t*-tests were conducted to examine whether PRF or mother-infant interaction was influenced by demographic, clinical, pregnancy, or postpartum variables. Pearson's correlation coefficients were calculated for correlations between PRF and interaction variables.

Results:

Psychosocial risk factors were prevalent among this group of mothers who experienced peripartum psychosis. High rates of unplanned pregnancy and maternal substance use during pregnancy was also observed and the majority mothers had a psychiatric admission, which necessitated early separation from their infants. The majority of mothers (65.00%) demonstrated a pre-mentalising level of PRF (Mean = 4.10). However, this capacity was not impaired in all mothers with peripartum psychosis. A large proportion of mothers (75.00%) exhibited the potential for adequate to complex PRF. Dyads achieved moderate scores for overall quality of interaction, maternal sensitivity, and infant social engagement and had a low level of dyadic reciprocity. These findings appear to support our hypotheses that mothers' experience of peripartum psychosis was associated with poorer PRF and quality of mother-infant interaction. Socio-demographic risk factors and factors related to pregnancy and postpartum experiences influenced PRF and quality of mother-infant interaction. A low positive correlation between PRF and quality of interaction was found (*r* = .40), which was weaker than we hypothesised.

Conclusions:

Peripartum psychosis was associated with lower PRF and poorer mother-infant interaction for the majority of our sample. Mothers who experienced peripartum psychosis may benefit from interventions targeting both PRF and quality of mother-infant interaction. Additionally, the provision of joint admissions, and pro-active psychoeducation about pregnancy planning and substance use are recommended.

Opsomming

Agtergrond:

Ernstige geestesongesteldheid in die peripartum periode mag 'n beduidende en nadelige uitwerking op versorging deur die moeder en die binding tussen 'n moeder en haar baba uitoefen. Die ervaring van psigose tydens swangerskap of die postpartum periode kan verder bydra tot die ontwikkeling van bindingsprobleme en swak uitkomste. Bindingsteorie ("Attachment theory") is gebruik as 'n leidende raamwerk om die ervaring en impak van peripartum-psigose op die moeder-baba diade te ondersoek. Babas van moeders met psigose loop die risiko om onseker of gedisorganiseerde bindingstyle te ontwikkel. Moeders met psigotiese steurnisse is geneig om gebrekkige sensitiwiteit en responsiwiteit in hul interaksie met hul babas te toon. Ouerlike reflektiewe funksionering (ORF) is die vermoë om 'n mens se eie geestestoestande, sowel as dié van jou kind, in gedagte te kan hou. Gebrekkige ORF kan 'n potensiële meganisme wees wat aanleiding gee tot gebrekkige binding en swak kwaliteit van moeder-baba interaksie. Peripartum-psigose mag 'n risiko verteenwoordig vir die moeder-baba diade as gevolg van die aard van simptome, asook die nodigheid vir psigiatriese toelating en skeiding tussen ma en baba. Suid-Afrikaanse studies van moederlike psigopatologie en die invloed daarvan op babas, plaas die fokus op moeders met depressie of trauma. Na ons wete is daar tot dusver geen studies oor die impak van moeders se psigose op ouerskap in Suid-Afrika nie. Daar is beperkte studies wat ORF in Suid-Afrika ondersoek, maar geen studies wat spesifiek fokus op hoe hierdie kapasiteit versorgingsgedrag van moeders met psigose in die peripartum beïnvloed nie.

Hierdie studie het ten doel gehad om die ORF en die kwaliteit van moeder-baba interaksie te ondersoek in 'n steekproef moeders met peripartum-psigose. Ons hipoteses was dat ervarings van peripartum-psigose geassosieër sal wees met 1) laer ORF en 2) swakker kwaliteit van moeder-baba interaksie. 'n Verdere hipotese was dat 3) inperkings in ORF gepaard sal gaan met verswakte moeder-baba interaksie.

Metodes:

Die studie het 'n verkennende, kwantitatiewe en beskrywende ontwerp gevolg. Veertig moeders met hoofsaaklik bipolêre steurnis of skisofrenie, wat ervarings van psigose tydens swangerskap of vroeë postpartum beleef het, is gewerf om hul vlak van ORF en kwaliteit van interaksie met hul babas te bepaal. 'n Gedetailleerde onderhoud is gevoer om relevante agtergrond-inligting te bekom. ORF is

gekodeer vanaf die "Parent Development Interview" en die kwaliteit van interaksie is geassesseer op grond van 'n ongestruktureerde spel-interaksie tussen moeder en baba. Twee-steekproef *t*-toetse is uitgevoer om te bepaal of ORF en moeder-baba interaksie beïnvloed was deur demografiese, kliniese, swangerskap of postpartum veranderlikes. Pearson se korrelasiekoëffisiënte is bereken vir korrelasies tussen ORF en interaksieveranderlikes.

Resultate:

Psigososiale risikofaktore was algemeen waarneembaar onder hierdie groep moeders wat peripartum-psigose ondervind het. 'n Groot aantal gevalle van onbeplande swangerskap en van moederlike middelgebruik tydens swangerskap is ook waargeneem. Die meerderheid moeders het 'n psigiatriese hospitaal-toelating gehad wat vroeë skeiding van hul babas genoodsaak het. Die oorgrote meerderheid moeders (65.00%) se ORF was laer as gemiddeld (Gemiddeld = 4.10). Hierdie kapasiteit was egter nie by alle moeders met peripartum-psigose ingeperk nie. Die meerderheid moeders (75.00%) het die potensiaal vir voldoende tot komplekse ORF getoon. Diades het gemiddelde tellings behaal vir algehele kwaliteit van interaksie, sensitiwiteit van die moeder en sosiale betrokkenheid van babas, en het lae tellings behaal wat betref diadiese wederkerigheid. Dit blyk dat hierdie bevindings ons hipoteses ondersteun dat moeders se ervaring van peripartum-psigose geassosieër sal wees met swakker ORF en die kwaliteit van moeder-baba interaksie sal hê. Sosio-demografiese risikofaktore en faktore wat verband hou met swangerskap en postpartum-ervaringe het ORF en die kwaliteit van moeder-baba interaksie beïnvloed. Daar was 'n lae positiewe korrelasie tussen ORF en die kwaliteit van interaksie (*r* = .40), wat swakker was as wat ons aanvanklike hipotese was.

Gevolgtrekkings:

Vir die meeste moeders het peripartum-psigose 'n assosiasie met laer ORF en swakker moeder-baba interaksie gehad. Moeders met ervarings van peripartum-psigose kan baatvind by intervensies wat gerig is op ORF sowel as die kwaliteit van moeder-baba interaksie. Daarbenewens word die voorsiening van gesamentlike opnames en pro-aktiewe psigo-opvoeding oor swangerskap beplanning en middelgebruik aanbeveel.

Acknowledgements

I wish to extend my sincere gratitude to the following individuals whose support made this study possible:

- Prof. Dana Niehaus, supervisor, for his patient guidance, encouragement, support, and expertise throughout this journey.

- Prof. Astrid Berg, co-supervisor, for her thoughtful guidance, mentorship, encouragement, and willingness to share her expertise in the field of infant mental health.

- To the mothers and infants who participated in the study – thank you for your willingness to share your (often difficult) experiences. My hope is that these findings will assist you and others to receive the support you need to overcome the challenges related to peripartum psychosis.

- Staff of the Maternal Mental Health Clinic at Stikland Hospital for their support and collaboration. In particular, I wish to thank Dr. Elsa Du Toit for assistance with participant recruitment, Gerdia Harvey for her assistance with participant recruitment and data capturing, and Sr. Plaatjies for her assistance with participant liaison and transport.

- Management and staff of Stikland Hospital for facilitating the study and providing the infrastructure and time to conduct the study. In particular, I wish to thank the staff of the female acute wards of Stikland Hospital for their assistance with the identification of participants.

- Drs. Corrie Schuman, Anusha Lachman, Kerry Louw, and Sunette Bodenstein for their assistance with participant recruitment.

- Colleagues (past and present) in the department of Psychology at Stikland Hospital for their encouragement and ongoing support, which allowed me to complete this project.

- Grateful acknowledgement to my funders: The National Research Foundation (Thuthuka Grant, PhD track), Subcommittee C of the Stellenbosch University, and the Harry Crossley Foundation, for making funds available. The Faculty of Medicine and Health Sciences Scientific Travel Fund and the Department of Psychiatry Scientific Travel Fund for providing funding for the presentation of preliminary results at the World Association of Infant Mental Health Congress.

- Patricia van Zyl and Aneesa Thomas for their assistance with managing the project's finances.

- Esmé Jordaan and Mikateko Mazinu from the Medical Research Council for their assistance with data analysis.

- Brenda Cowley and Dr. Helena Lategan for their assistance with the coding of data.

- Leigh Story for her assistance with transcription and translation of interviews.

- Irene Mbanga for her assistance with translation and Mart Qumba for her assistance with translation and transcription.

- Michelle Pienaar, Shané La Fleur and Chrizelle Visser, for volunteering their time to assist with the transcriptions of interviews.

- Prof. Nancy Suchman and Dr. Michelle Sleed for their guidance in the use and interpretation of the measurement tools.

- Johan Liebenberg for his assistance with language editing.

- Dr. Karis Moxley for her guidance, feedback, and encouragement throughout.

- My family and friends who encouraged me during this journey. Thank you for your patience and faith in me.

- My parents, André and Susan Diedericks, for providing me with the opportunities to pursue my goals and their never-ending belief in me, I am truly grateful for everything that you have done for me. My brother, Reino Diedericks, for his unconditional love and support.

Dedication

To my husband, André Voges – Without your love and support I would not have been able to complete this journey. You are the one person I can always depend on – thank you for inspiring me and for never giving up hope. I am truly blessed to be your wife.

To my daughter Kira Voges – You are a source of infinite joy and inspiration every day – may you always follow your dreams.

Abbreviations

AAI	Adult Attachment Interview
AMBIANCE	Atypical Maternal Behaviour Instrument for Assessment and Classification
CIB	Coding Interactive Behaviour System
DCHS	Drakenstein Child Health Study
DSM-V	Diagnostic and Statistical Manual of Mental Disorders, 5th edition
FEP	First episode psychosis
fMRI	Functional magnetic resonance imaging
IPV	Intimate partner violence
KMC	Kangaroo mother care
MBU	Mother-and-baby unit
MDD	Major depressive disorder
MOU	Midwife obstetric unit
ICD-11	International Statistical Classification of Diseases and Related Health Problems, 11th edition
PANSS	Positive and Negative Syndrome Scale
PDI	Parent Development Interview
PMHP	Perinatal Mental Health Project
PRF	Parental reflective functioning
PTSD	Post-traumatic stress disorder
RF	Reflective functioning
SCI-PANSS	Structured Clinical Interview for the Positive and Negative Syndrome Scale
SMI	Severe mental illness
ToM	Theory of mind

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Chapter 1: Introduction

Background

The presence of severe mental illness (SMI) in the peripartum period has a significant and detrimental impact on maternal caregiving and mother-infant attachment (Hipwell et al., 2000). Mothers who experience symptoms of psychosis during and after pregnancy may be particularly vulnerable to the development of attachment difficulties (D'Angelo, 1986; Näslund et al., 1984).

This chapter provides a brief introduction to the topics relevant to the study, sets out the research question and associated aims, and finally provides an overview of the chapters of the thesis.

Attachment Framework

The theoretical framework of attachment theory as conceptualised by Bowlby, underlies the current investigation into the experience and impact of peripartum psychosis on the mother-infant dyad. Attachment can be defined as the persistent and significant affectional bond that develops between a child and his or her caregiver (Bowlby, 1982). The attachment bond forms the foundation for a 'secure base' from which the infant is able to engage in exploration of their environment, and develop independence (Berry et al., 2008). John Bowlby's (1982) observations of infant behaviour patterns of proximity-seeking during distress and exploration during times of security, led him to develop the concept of an attachment behavioural system, which he proposed has an evolutionary, adaptive function to increase infant safety, promote exploration of the environment as well as social interaction (Cassidy et al., 2013). The infant develops an organised pattern of attachment behaviours in relation to the primary caregiver which is influenced by the security felt in that relationship (Ma, 2006). Under optimal conditions, all infants will form an attachment bond to a consistent caregiver (Sroufe, 2017).

The attachment relationship with a primary caregiver, most often their mother, provides the infant with their earliest environment within which to develop social competence and emotion regulation (Marvin & Britner, 2008). The security that the infant experiences within this attachment relationship is of particular importance to the infant's social and emotional development (Rosenblum et al., 2009). Conversely, an insecure attachment has been associated with detrimental infant outcomes. Insecure

attachment is significantly associated with higher rates of internalising symptomatology, which include depression, anxiety, social withdrawal and somatic complaints (Groh et al., 2012), as well as externalising symptomatology, which include aggression, oppositional problems, conduct problems or hostility (Fearon et al., 2010).

An infant's early experiences of caregiving are particularly important in the development of an attachment with their caregiver, as well as the experience of security during the period shortly after birth. Expanding on Bowlby's initial focus on attachment and separation, Mary Ainsworth (1967) examined the characteristics of maternal caregiving that precipitates infant attachment behaviours. She identified maternal sensitivity as an important contributing factor influencing the security of infant attachment (Posada, 2013). Her conceptualisation of the sensitivity construct included the following three characteristics (Ainsworth, 1967):

> (i) Infant signals are accurately perceived and interpreted. These signals may constitute social signals, or need and distress. Caregiver responses are prompt and appropriate.

> (ii) In the mother's playful interactions, she is attuned to the infant's state and mood, which is predominantly infant-led, instead of mother-led.

> (iii) Interaction is of greater importance than routine care, with good interaction characterised by mutual delight.

While biological and environmental factors may contribute significantly to the infant's developmental trajectory, the quality of caregiving has a long-lasting influence on the infant's social, cognitive, emotional and behavioural well-being (Thompson, 2008). In situations where the caregiving environment is disrupted by maternal mental health difficulties, there may be a compromised attachment relationship and impairment in the quality of mother-infant interaction (Hipwell et al., 2000). A meta-analysis by Van Ijzendoorn and colleagues (1992) found that in clinical populations, maternal factors play a greater role in determining the quality of mother-infant attachment relationships than child factors.

Maternal Psychosis

The *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*) defines the key features of psychotic disorders as the presence of delusions, hallucinations, disorganised thinking,

disorganised or abnormal motor behaviour, and negative symptoms (American Psychiatric Association, 2013). Maternal psychotic symptoms may impact the mother-infant relationship via several mechanisms, including: involvement of the infant in delusions or hallucinations, the presence of disorganised behaviours, and abnormal expressions of affect, such as blunted or perplexed affect (Bosanac et al., 2003). Maternal psychotic illnesses, such as schizophrenia, have been associated with a greater risk of early separation from, or losing care of their infants (Ramsauer & Achtergarde, 2018).

Infants of mothers with psychotic illnesses are at greater risk of developing insecure or disorganised attachment when the mother's symptoms are severe, prolonged and if there are unresolved maternal traumas (Wan & Green, 2009). Mothers with schizophrenia have also been shown to have impaired quality of interactive behaviour with their infants, which is associated with a lack of sensitivity and responsiveness (Wan et al., 2007). Their interaction was characterised by physical and psychological remoteness, as well as behavioural intrusiveness towards their infants.

Parental Reflective Function

In addition to caregiving behaviour, parental mental representations play an important role in understanding the mother-infant relationship. There is a well-documented association between the coherence and quality of a parent's attachment narrative, and their infant's attachment security (Fonagy & Target, 1997; Main et al., 1985). A meta-analysis of parental and parent-infant attachment classifications confirmed their concordance, but found that parental responsiveness alone did not fully account for this association (van Ijzendoorn, 1995).

Fonagy and colleagues (1991) suggested that it is the mother's capacity to make sense of her child's behaviour in light of internal, affective experiences, that determines the child's felt security in their relationship. A parent's capacity to understand and hold in mind her own and her child's mental states, is known as parental reflective functioning (Slade, 2005). The Parent Development Interview (PDI) was developed to assess the parent's representations of their child, and of their developing relationship, within a developmental context (Aber et al., 1985; Slade et al., 2014). A parent's reflective functioning is closely related to their own attachment classification, as well as to their infant's security of attachment (Slade et al., 2005).

During infancy it is particularly important for the parent to be able to recognise and accurately interpret the infant's emotional and behavioural cues, as prior to developing speech, these are the infant's only available means of communicating their needs. A parent's reflective capacity also influences her caregiving behaviour. In a study examining disrupted maternal affective communication, greater reflective capacity was significantly associated with a lower likelihood of disrupted maternal behaviour (Grienenberger et al., 2005). The mother's ability to regulate her infant's distress through her caregiving behaviour mediated the impact of the mother's reflective capacity on infant attachment.

Parental reflective functioning has been examined in a number of clinical populations, including mothers with experiences of trauma, borderline personality disorder, and substance use disorder, but not specifically in mothers with psychotic disorders (Camoirano, 2017). Reflective functioning has been evaluated in the Adult Attachment Interviews of two samples of young people with first episode psychosis (Braehler & Schwannauer, 2012; MacBeth et al., 2011). Both research groups found low reflective functioning, but MacBeth and colleagues (2011) found that reflective capacity was not associated with psychotic symptoms, or general psychopathology. Given the importance of early experiences, it would be important to examine reflective functioning, specifically related to parenting, in mothers with experiences of psychosis.

South African Context

Perinatal mental disorders such as depression or anxiety are more prevalent in low- and middle-income countries than in high-income countries (Fisher et al., 2012). However, perinatal mental health studies are more common to high income countries, with a lack of information from low- and middle-income countries (World Health Organization, 2008). A systematic review by Fisher and colleagues (2012) identified that women in these countries frequently experience a number of risk factors, including socio-economic disadvantage, unplanned pregnancy, lack of support from their partners and intimate partner violence.

A similar trend is observed in infant mental health literature. The majority of studies on infancy published in academic journals are from North America, Europe and Australasia (Tomlinson et al., 2014; Tomlinson & Swartz, 2003). The candidate completed a review of studies of infant attachment in Africa, and found only nine studies from five countries on the continent (Voges et al., 2019). These

studies identified multiple socio-economic factors contributing to the caregiving burden of mothers in Africa.

Studies of maternal psychopathology and infant outcomes in South Africa have focussed on maternal depression (Cooper et al., 1999, 2002, 2009; Stein et al., 2015; Tomlinson et al., 2005) and trauma (Choi et al., 2017). To our knowledge, there are no studies examining maternal psychosis in the context of parenting in South Africa. Although there have been two studies examining parental reflective functioning in South Africa, none have focussed specifically on how this capacity influences caregiving behaviours among mothers with psychotic illnesses (Adams, 2020; Suchman et al., 2020).

Central Theme and Research Question

This study is a descriptive examination of the reflective functioning (RF), parenting experiences and behaviours of a group of women who experienced peri- and postpartum psychosis. The study aims to answer the research question: How do experiences of psychosis in the peri- or postpartum affect parental reflective function (PRF) and quality of mother-infant interaction? Ultimately, the study set out to determine if there is an association between parental reflective functioning and the quality of parent-infant interaction with regard to maternal, infant and dyadic factors.

Study Aims and Hypotheses

Three primary aims were identified with this study with regard to the PRF and quality of interaction of mothers who had experiences of psychosis. Each of the aims will be provided with the corresponding hypotheses.

Research Aim 1:

To determine the PRF of mothers who experienced peri- or postpartum psychosis. PRF will be assessed by the Parent Development Interview (PDI).

Primary Hypothesis: Mothers with peri- or postpartum psychosis were expected to demonstrate less parental reflective capacity as indicated by an Overall RF score lower than 5 on the PDI.

Secondary Hypothesis: Mothers with peri- or postpartum psychosis were expected to demonstrate less than ordinary parental reflective capacity as indicated by scores lower than 5 in relation to themselves (as indicated by Self-focussed RF), to their infants (as indicated by Child-focussed RF), their illness (as indicated by Illness-focussed RF) and in their potential for reflective functioning (as indicated by RF Potential).

Research Aim 2:

To assess the quality of mother-infant interaction in dyads where the mothers experienced peri- or postpartum psychosis. The quality of mother-infant interaction will be assessed with the Coding Interactive Behaviour (CIB) system as applied to an unstructured play interaction.

Primary Hypothesis: Mothers with peri- or postpartum psychosis were expected to demonstrate moderate or lower quality of mother-infant interaction, as indicated by a total score of 3 and lower on the Coding Interactive Behaviour (CIB) scale.

Secondary Hypothesis: Dyads of mothers with peripartum psychosis were expected to demonstrate moderate or lower quality of Maternal Sensitivity, Limit Setting, Child Social Engagement, and Dyadic Reciprocity, as indicated by scores of 3 or lower on these constructs. Dyads of mothers with peripartum psychosis were expected to demonstrate the presence of Maternal Intrusiveness and Negative Emotionality, Infant Withdrawal, and Dyadic Negative State as indicated by scores of 2 or greater on these constructs.

Research Aim 3:

To evaluate the association between PRF and the quality of mother-infant interaction, with respect to maternal, infant and dyadic factors observed in this cohort.

Primary Hypothesis: There will be a moderate positive correlation between PRF as indicated by the overall PRF score and overall quality of mother-infant interaction, as derived from the total CIB score.

Secondary Hypothesis: There will be moderate positive correlations between PRF and Maternal Sensitivity and Limit Setting, Child Social Engagement and Dyadic Reciprocity. There will be moderate negative correlations between PRF and Maternal Intrusiveness and Negative Emotionality, Infant Withdrawal and Dyadic Negative State.

Overview of Chapters

Chapter 1 (Introduction) provides the rationale and background to the present study. The primary objective and aims for the study are described and an outline of the chapters for the manuscript is provided.

Chapter 2 is in the form of an article, titled *Revisiting the African origins of attachment research – 50 years on from Ainsworth: A descriptive review*, published in 2019 in the Infant Mental Health Journal. This review article aimed to consolidate the current knowledge of infant attachment that has originated from Africa. The literature review continues with **Chapter 3**, which provides a brief overview of attachment theory, and describes the use of attachment as a developmental framework from which to understand psychosis. Thereafter, the concept of reflective functioning is described, with a particular focus on parental reflective functioning. Finally, the chapter provides an overview of the current knowledge regarding maternal caregiving in the context of psychosis.

Chapter 4 (Methods) reiterates the central research question, aims and hypotheses of the study. It continues by outlining the research design, research instruments and statistical analyses employed in the study. Finally, the ethical considerations are presented.

Results from the data collected in the study will be presented in **Chapter 5** and **Chapter 6** (Results). Chapter 5 is in the form of a manuscript currently under review at the African Journal of Reproductive Health. This manuscript outlines the demographic characteristics and pregnancy outcomes of the participants in the study. Chapter 6 presents the demographic and clinical results of the study and thereafter provides the results for the quantitative measures of reflective function and parent-infant interaction, with their association with the demographic and clinical variables. Finally, the correlations between parental reflective functioning and quality of mother-infant interaction are reported.

Chapter 7 (Discussion) provides a discussion of the findings of the study in light of existing knowledge. The discussion will focus on the sample characteristics, parental reflective functioning and mother-infant interaction results as well as the association between these variables.

Finally, **Chapter 8** (Conclusion) provides a summary of the findings and provides suggestions for clinical practice that were derived from the results.

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Chapter 2: Literature Review – Attachment in Africa

This chapter forms part of the literature review of the study and is an article published in the *Infant Mental Health Journal* in 2019. The impact factor of the journal is 1.389, URL: https://onlinelibrary.wiley.com/journal/10970355). In the article, infant attachment security is categorised as A (avoidant), B (secure), C (resistant) or D (disorganised). Each of these categories are defined in Chapter 3.

ARTICLE

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Revisiting the African origins of attachment research—50 years on from Ainsworth: A descriptive review

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ABSTRACT

Culture plays a significant role in the variations observed in the manifestation, expression, and meaning of attachment behaviors. Africa is home to multiple cultures, with distinct organizations of caregiving relationships underlying the development of attachment. This review aims to consolidate knowledge about African attachment by describing studies of infant attachment conducted in Africa since Mary Ainsworth's Ugandan findings in 1967. Electronic databases were searched with the terms "Africa" ("attachment" or "bond") and "infant." Nine studies that assessed infant attachment style with self-report or observation methods were included, but spanned only five countries. The Strange Situation Procedure was most frequently used. Most studies described dyads living in peri-urban or township areas. Multiple socioeconomic factors affecting living conditions were identified, including, unemployment, financial difficulties, limited education, poor housing, single parenthood, lack of partner support, substance abuse, and depression. Overall distributions of attachment classification proportions appear consistent with global attachment-classification patterns. Despite adverse conditions, secure attachment was relatively widespread, and some populations had low rates of avoidant attachment. Relatively high rates of disorganized attachment were found when the category was included. Africa remains an understudied continent regarding infant attachment. The continent's cultural diversity may hold important truths necessary for understanding the complex relationship between infant and attachment figure.

KEYWORDS

Africa, attachment, culture, infant attachment, parenting

1 | INTRODUCTION

The desire to make a human connection is universal. It starts at birth between an infant and caregiver; under optimal conditions, all infants will form an attachment bond to a consistent caregiver (Sroufe, 2017). The specific behaviors and characteristics of this bond, however, differ significantly depending on the individuals involved and the context in which it occurs. Culture plays a significant role in the variations observed in the manifestation, expression, and meaning of attachment behaviors. Notwithstanding these variations, attachment the-

ory has been demonstrated to have cross-cultural validity as a model to understand the process and nature of the formation of an infant–caregiver bond (van IJzendoorn & Sagi-Schwartz, 2008).

John Bowlby (1982) proposed that an infant's attachment behavior is organized around a behavioral control system that develops through interaction between the infant's potential for learning and a pattern of caregiving within his environment that the infant has come to expect. This behavioral system balances proximity and exploration, and parents adapt their behavior to the infant's needs to create safety and

security (Bowlby, 1982). During the 1950s, Mary Ainsworth, an American Canadian developmental psychologist, conducted a groundbreaking study of mother–infant interaction, using observational methods to investigate the application of Bowlby's theory of attachment in a cross-cultural setting (Ainsworth, 1967). From these detailed, naturalistic observations of mother–infant interactions over time, Ainsworth compiled an ethogram of attachment behavior patterns, which culminated in the recognition of the secure base concept (Posada & Trumbell, 2017). This seminal study of mother–infant interactions in Uganda led to one of the first cross-cultural comparisons of infant behavior when she replicated her procedures in Baltimore, Maryland. There, Ainsworth was able to demonstrate the association between maternal sensitivity and the use of the mother as a secure base. The information she gathered from both observations led to the identification of the tripartite classification system of infant attachment and the development of the Strange Situation Procedure (SSP), a method of assessing infant behavior under mildly stressful conditions to activate attachment behavior (van IJzendoorn & Sagi-Schwartz, 2008). The classification system categorizes the pattern of interaction between an infant and a caregiver into three categories, respectively termed *secure*, *avoidant*, and *resistant*.

An additional category, *disorganized attachment*, has subsequently been included to account for infants who display conflicted, contradictory, or disoriented behaviors during the SSP (Main & Solomon, 1990). Disorganized infant behavior has become an increasingly popular research topic, as it has been demonstrated to be a significant indicator for infant mental health and developmental trajectories (Lyons-Ruth & Jacobvitz, 2008). Similarly, the SSP is seen as the "gold standard" for evaluating attachment and has been utilized in a variety of contexts, including clinical and high-risk populations, and across continents (van IJzendoorn & Kroonenberg, 1988; van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004).

Despite the focus on cross-cultural phenomena in the early history of attachment research, much of our current knowledge has been shaped by research, assessment, and terminology from Western cultures. Tomlinson and Swartz (2003) highlighted the significant imbalance in the origins of knowledge about infants through a review of leading infant mental health journals that appeared between 1996 and 2001. A significant finding was that 94% of articles published in these journals were authored by individuals from Europe (16%) or North America (78%). Indeed, they underlined the fact that infants from low-income and developing countries make up about 90% of the total infant population, but that most of the knowledge is generated in high-income countries, with very different realities in terms of resources and living conditions. A subsequent review of publications that appeared between 2002 and 2012 indicated a slight improvement, but

still a large imbalance: Most (82%) of the articles originated from North America, Europe, and Australasia (Tomlinson, Bornstein, Marlow, & Swartz, 2014). The question arises whether the findings from high-income countries are generalizable to families/parent–infant dyads in low- and middle-income countries (LMIC), given their vastly different circumstances and parental experiences. Given the vast number of different countries and cultures worldwide, van IJzendoorn and Sagi-Schwartz (2008) aptly noted that the "current cross-cultural data base is almost absurdly small" (p. 901).

In a comparative study of American and Japanese attachment security, Rothbaum, Weisz, Pott, Miyake, and Morelli (2000) called for an indigenous approach to attachment research. They maintained that despite the widespread focus on universal factors in cross-cultural attachment research, "culture warrants a more central role in the study of attachment" (Rothbaum et al., 2000, p. 827).

In an effort to determine the relevance and validity of attachment theory across different cultures, van IJzendoorn and Sagi-Schwartz (2008) examined evidence from studies involving cultures other than those of Anglo-Saxon or European origin. Four hypotheses that make up the core tenets of attachment theory were tested: (a) the *universality* hypothesis (that all infants become attached to one or more caregivers, given an opportunity), (b) the *normativity* hypothesis (that secure attachment is the predominant classification and normative from a psychological and numerical point of view), (c) the *sensitivity* hypothesis (that secure attachment is contingent on the provision of sensitive and prompt responses from a caregiver to an infant's signals), and (d) the *competence* hypothesis (that secure attachment is associated with better outcomes in various developmental domains, including regulating negative affect, cognitive development, establishing satisfactory peer and teacher relationships).

The notion that attachment is a universal phenomenon was supported by all the cross-cultural studies examined. There was also strong support for the normative hypothesis, with compelling evidence that attachment is not only a Western invention or ideal but "a rather widespread and preferred phenomenon" (van IJzendoorn & Sagi-Schwartz, 2008, p. 897). Although there was some support for the sensitivity and competence hypotheses, there remains room for additional examination.

Bowlby (1952) initially proposed a monotropist view of parenting—that there is one primary attachment figure who has a dominant influence on a child's development, to the extent that the influence of other caregivers is negligible. Most attachment research methodologies support the view that mothers are central in the social development of infants, as evidenced by the dominance of measures examining the mother–infant relationship in the assessment of attachment (e.g., the SSP [Ainsworth, 1978] and Maternal Q-sort [Waters, 1995]). However, alternative models of parenting

originated from the awareness that the monotropist view is not sufficient to understand contexts in which there are multiple caregivers. There is a growing recognition that individuals other than the mother, such as fathers, siblings, and peers, play an important role in the social development (experiences) of infants, notably in many non-Western cultures (Spicer, 2011; Tronick, Morelli, & Ivey, 1992).

One of the criticisms against traditional methods of attachment assessment is that the measurement instruments and procedures are biased toward Western ideals, which are based on a monotropist view of parenting (Rothbaum et al., 2001). In an effort to evaluate the use of the SSP and determine the magnitude of between- and within-culture differences, van IJzendoorn and Kroonenberg (1988) conducted a cross-cultural meta-analysis. They found significant intracultural variation, which exceeded cross-cultural variation. Socioeconomic status and environmental factors may account for differences as much as do cultural differences. Posada et al. (1995; Posada, 2013) found similar results when comparing secure base behavior of children from 13 countries using the Attachment Q-sort (AQS; Waters, 1995). Their findings have indicated that the secure base phenomenon is present in both Western and non-Western populations, and although culture-specific differences exist in the organization of attachment behavior, the within-country similarities are not greater than those found between countries (Posada & Trumbell, 2017).

The African continent is home to 1.2 billion people living in 54 recognized sovereign states and countries and 9 territories (World Population Review, 2016). Most of these countries are home to multiple cultures, each with their own behavioral patterns and organizations of caregiving relationships that underlie the development of attachment. Rural and urban communities also differ in terms of their uptake of modern parenting practices. Almost 60% of the African population lives in rural areas (United Nations, 2015).

This review aims to consolidate the knowledge about African infant attachment by describing the studies of infant attachment conducted in Africa since the publication of Ainsworth's Ugandan findings in 1967.

2 | METHODS

2.1 | Search strategy

A systematic search was conducted to identify studies of infant attachment in Africa. The following electronic databases were searched for relevant studies published up to December 2016: EBSCOhost (including Africa-Wide Information, CINAHL, MEDLINE, PsychINFO, and ERIC), PubMed, Scopus, and Google Scholar. The broad search terms "Africa" ("attachment" or "bond*") and "infant" yielded a large number of results. The title and abstract of each returned citation was inspected for relevance. The reference lists of the retrieved studies were examined manually to identify additional relevant articles.

2.2 | Inclusion criteria

Studies were included for review if they met the following criteria: (a) assessed the attachment style through self-reporting or observational methods in any African country, (b) focused on attachment patterns of an infant or a young child (defined as birth–3 years of age), and (c) were published in an English peer-reviewed publication between 1976 and December 2016.

3 | RESULTS

A total of nine studies from five countries met all the inclusion criteria and made up the final sample for this review. Table 1 presents a summary of the locations, sample sizes, instruments used, and ages of infants, in country alphabetical order. The studies found to be eligible for the review are discussed separately by country, and their significant contributions to the cross-cultural understanding of attachment in Africa are highlighted.

3.1 | Overall attachment proportions

All but one study found secure attachment to be the most frequently observed classification. Six studies used the SSP to assess infant attachment security, two utilized an observer-rated AQS, and one designed an attachment rating system specifically for their study. As the SSP was most frequently used and is considered the gold standard for the assessment of attachment classification, these studies are grouped together and summarized in Table 2. The distribution of attachment classifications from studies that used alternative measures is shown in Table 3.

3.1.1 | Results of studies utilizing the SSP

Overall, between 53 and 87% of African infants were securely attached to their mothers when considering only secure and insecure attachment in the six studies reporting results from the SSP. For those studies reporting ABC classifications ($n = 4$), the avoidant category showed marked variation (0–29%) whereas the resistant category was more consistent (11–17%). Notably, the overall distributions of attachment classification proportions appear to be consistent with those found by van IJzendoorn and Kroonenberg (1988) in their meta-analysis of global attachment classification patterns (avoidant 21%, secure 65%, and resistant 14%).

When comparing studies that used the ABCD classification system ($n = 4$), similar variation in avoidant classification and consistency in resistant classification is observed. Rates

TABLE 1 Summary of relevant studies

Country	City or region	Author(s)	Publication year	Sample size[a]	Instrument	Infant age (in months)
Kenya	Kisii district	Kermoian & Leiderman	1986	26	Adapted SSP	8–27
	Nairobi	Bryant et al.	2012	2560	Attachment Assessment Score Sheet	1–60
Mali	Bandiagara plateau	True, Pisani, & Oumar	2001	42 mother–infant pairs	SSP	10–12,5
South Africa	Johannesburg	Minde, Minde, & Vogel	2006	46	AQS	18–40
	Khayelitsha	Tomlinson, Cooper, & Murray	2005	98	SSP	18
	Khayelitsha	Cooper et al.	2009	318	SSP	18
	Hanover Park	Tomlinson	2001	41	SSP	24
Uganda	Kampala	Peterson et al.	2001	60	AQS	20–30
Zambia	Lusaka	Mooya, Sichimba, & Bakermans-Kranenburg	2016	41 mother–infant pairs	SSP	12–24

Note. SSP = Strange Situation Procedure; AQS = Attachment Q-sort.
[a] Sample size of attachment classification.

TABLE 2 Distribution of attachment classifications (shown as %) measured by SSP

First author	Two-way		Three-way			Four-way			
	Secure	Insecure	Avoidant	Secure	Resistant	Avoidant	Secure	Resistant	Disorganized
Kermoian	61.54	38.46							
True	87.00	13.00	0.00	87.00	13.00	0.00	67.00	8.00	25.00
Tomlinson et al., 2005	72.20	27.80	16.50	72.20	11.30	4.10	61.90	8.20	25.80
Cooper 1[a]	74.00	26.00				10.90	74.36	8.33	6.41
Cooper 2[b]	63.00	37.00				19.00	63.00	8.00	10.00
Tomlinson, 2001	53.70	46.40	29.30	53.70	17.10				
Mooya	59.00	41.00	24.00	59.00	17.00	20.00	46.00	5.00	29.00

Note. [a] Cooper 1: Intervention group. [b] Cooper 2: Control group.

TABLE 3 Distribution of attachment classifications measured by alternative measures

First author	Instrument	Two-way	
		Secure	Insecure
Minde	AQS (Observer-rated)	47.00%	53.00%
Peterson	AQS (Observer-rated)	$r = .31$[a]	
Bryant	Attachment Assessment Score Sheet	90.20%	9.80%

Note. AQS = Attachment Q-sort.
[a] This correlation represents how well the observed dyads corresponded to a secure prototype.

of disorganized attachment ranged between 6 and 29%, with three studies reporting at least one fourth of their samples to fall in this category.

3.1.2 | Results of studies utilizing alternative attachment measures

Two studies made use of the AQS, an observational assessment conducted in the home. The AQS is expressed as a correlation coefficient, indicating to what extent aspects of the dyad's behavior is similar to that of a range of attachment behaviors associated with secure attachment. This is a continuous score indicating the degree of attachment security, with higher scores indicating secure attachment and lower scores indicating insecure attachment, but the measure does not include items that would identify attachment disorganization. Of the two studies making use of the AQS, one reported the proportion of secure attachment as 47% (Minde, Minde, & Vogel, 2006). The other study reported a correlation of .31 between the observer's Q-sort of the dyads studied and the prototypical Q-sort of dyads that are securely attached (Peterson, Drotar, Olness, Guay, & Kiziri-Mayengo, 2001). This correlation coefficient is similar to the mean security score of .35 found by Cadman, Diamond, and Fearon (2018) in their meta-analysis of 186 samples. Attachment is deemed secure when there is a correlation of .3 or greater between the observer and criterion sorts (Minde et al., 2006). The remaining study developed a rating system to assess parent–child attachment, based on tools such as the Circle of Security Index (Marvin, Cooper, Hoffman & Powell, 2002), the Parent Development Interview (Slade, Grienenberger, Bernbach,

Levy, & Locker, 2005), and the Adult Attachment Interview (George, Kaplan & Main, 1985) (Bryant et al., 2012). The proportion of these dyads that were rated as secure was the highest among all the studies reviewed (90%).

3.2 | Review of relevant studies by country

3.2.1 | Kenya

Kenya was the site of two studies that characterized the attachment classification of infants. The older of the two is a much-cited examination of the caretaking practices of the Gusii tribe from the Kisii district, in the Southwestern area of Kenya (Kermoian & Leiderman, 1986). In this community, mothers are involved in a wide variety of activities such as farming, food preparation, and collecting firewood and water in addition to childcare. This is made possible by the practice of delegating several tasks to older children who share significant responsibility for childcare. What sets this community apart is that Gusii mothers typically engaged younger caretakers more frequently and for more substantial activities than did mothers from other communities. The authors described a distinct division of roles, with mothers taking responsibility for meeting the infant's physical needs such as breastfeeding and bathing. The balance of the daytime care is provided by child caregivers, who remain in constant contact with the infant—first carrying them, then maintaining close contact once the infant has achieved locomotion. Child–caregiver interaction would typically involve play and social activities aimed at enhancing social and cognitive development. A sample of 26 infants, ranging from 8 to 27 months of age, were observed.

The interactions of infants with their mothers and child caregivers were assessed using an adapted separation/reunion paradigm, which followed the SSP format. Infants were videotaped in a series of episodes carried out on a mat outside their mother's hut. Individual infants were initially alone for a period of 1 min and were then joined by an adult figure. The adult greeted the infant with a handshake and attempted to engage the infant in interaction (duration of 2 min). The adult then said goodbye and departed, and the infant was left alone on the mat for 3 min. Upon the second reunion, the adult again greeted the infant with a handshake, comforted the infant if distressed, and attempted to engage the infant in interaction (duration 2 min). Three repetitions of each cycle of episodes were completed with the mother, the child caretaker, and an unfamiliar adult, respectively, and the order of their presentation was randomized. The distinct division of roles allowed for the examination of the effect of different interaction activities on attachment security and aspects of infant development. Children of both genders are typically included in caretaking activities. Caretaking used to be delegated to a sibling between the ages of 7 and 12 years, but as more of them started attending school, the role was transferred to preschool-age siblings. In the study concerned, about

half of the child caretaker sample was 6 years old or younger, and 8 of the caretakers were 4 years old or younger. Attachment was assessed using Ainsworth's rating and classification procedures and was repeated approximately 3 months later to determine the stability of attachment security.

Most infants were rated as securely attached to their mothers (61%), and just over half (54%) of the infants were classified as securely attached to their child caretaker. Attachment classifications were highly stable over time. Only 10 infants (38%) received secure classifications for both mother and child caretaker, and almost one fourth (23%) were rated as anxiously attached to both figures. Security of attachment to mother and child caretaker was not found to be significantly associated, which lends further weight to the idea that attachment classification is a not a measure of infant temperament but specific to a particular relationship. Household factors associated with increased maternal availability were associated with a greater likelihood of secure attachment. Infants who had a younger sibling were more likely to be classified as anxiously attached to their mothers. Note that around the time of weaning, Gusii infants appeared to be more vulnerable to anxious attachment to the mother, as breast-feeding—one of the primary sources of interaction with the mother—was being withdrawn. Despite differentiation in the roles of the mother and child caretaker, the activities in which each of these figures engaged is sufficient to establish a secure attachment relationship. However, the role division seems to be associated with separate measures of infant functioning. Security of attachment to the mother was significantly associated with physical growth whereas security of attachment to the child caretaker was significantly associated with cognitive development of the infant.

The second Kenyan article is a study by Bryant et al. (2012), which shows how the incorporation of attachment assessment can enhance the efficacy of primary healthcare in early identification of parent–child difficulties and, subsequently, appropriate interventions. This study forms part of the larger Orphans and Vulnerable Children's Project, aimed at improving the well-being of people living in slums and early childhood development. Although the age range studied extended beyond infancy, it was included in the current review because it also included infants. The project focused on three urban slums outside Nairobi, where 24 community health workers were trained to assess caregiver–child attachment as a routine part of their home visits. Within each of the areas, all households with children under 5 years of age were visited and assessed on variables such as height, weight, general health, malaria and diarrhea, hygiene practices, and attachment security. Attachment was assessed using a screening tool developed specifically for this project, which was derived from, among others, the Circle of Security Index, the Parent Development Interview, and the Adult Attachment Interview. The tool was adapted to the specific African culture.

Community health workers were trained to identify specific behavioral indicators and to assess the caregiver–child relationship within the home context. Behavior was rated according to its consistency to that seen in secure attachment relationships, and the resultant score provided a measure of risk in the relationship. Those dyads identified as at risk for insecure attachments were referred to parent workshops and peer support.

A total of 2,560 children were visited, and most assessments (92%) included a parent as caregiver. The majority of dyads were rated as securely attached to their caregivers, and only 9.8% of children were identified as "at risk" of being insecurely attached to their caregiver. The children at risk for insecure attachment were less likely to wash their hands regularly and have a normal weight for age and were more likely to have diarrhea and malaria than were those rated as securely attached. This study appears to be an outlier in comparison to the other studies included in our review. The rate of secure attachment appears to be substantially greater than that found in other African communities, possibly due to methodological differences which may have compromised the validity and reliability of the assessments. The novel assessment instrument was derived from tools primarily aimed at assessing parental behavior relating to attachment. The tool was developed as a screening measure to assess relationships at risk of insecure attachment. The tool was not designed to be diagnostic in nature, and it has not been validated. Nonprofessional individuals administered the assessments and the validity and reliability of their assessments may be questioned. Despite these concerns, Bryant et al. (2012) provided a novel approach to supporting early childhood development within primary healthcare in a resource-limited environment.

3.2.2 | Mali

True, Pisani, and Oumar (2001) assessed mother–infant attachment security among a traditional, agrarian community in Mali, West Africa. They studied the interaction and communication patterns of the Dogon ethnic group. As summarized by the authors, the Dogon people are unique in that they live in relative geographical isolation and therefore have developed a unique culture. Dogon people have an integrated set of religious, medical, and social beliefs, and still practice animist rituals in both the villages and towns. The economies of the villages rest on the farming of millet and fresh produce in family gardens, and on craft sales. The villages do not have electricity, and water is drawn from a well. A high rate of infant mortality is associated with an unpredictable food supply, contamination of drinking water, and the presence of serious diseases such as measles and malaria. The towns are significantly larger than the villages, with household incomes generated by a combination of formal employment and the informal sale of produce, services, or crafts. There was no

electricity in the town included in the study, but media devices were widely used.

Dogon families are polygamous and patrilineal, and the households included in the study typically included a father, his wife and cowives, and their children. They lived in small buildings around a courtyard where cooking, cleaning, and socializing took place. The Dogon infants typically experienced a rich social environment, and childcare arrangements showed significant variation (True et al., 2001). Some mothers were the primary caregivers whereas some shared the responsibility with another family member, and other infants were cared for by a grandmother. Where the mother was not the primary caregiver, she was still significantly involved, as breastfeeding remained her responsibility. Attachment behaviors typical to the Dogon culture include frequent breast-feeding on demand, a rapid response to infant distress, and constant proximity to a caregiver. The study by True et al. (2001) aimed to establish how communication and maternal factors were related to attachment insecurity and disorganization. Three attachment hypotheses were tested: (a) whether attachment security was associated with differences in mother–infant communication, (b) whether attachment security was related to maternal sensitivity, and (c) whether there was an association between infant disorganization and maternal behaviors classified as frightened or frightening. A total of 42 mother–infant pairs from the Dogon ethnic group were recruited from two villages and a rural town in Eastern Mali. Infant attachment security was assessed with the SSP.

In the town sample, attachment security was not significantly related to the infant's gender or financial status, or whether the mother or grandmother was the primary caregiver. Using the four-way (ABCD) scoring system, two thirds of the infants were rated as securely attached, one fourth as disorganized, 8% as insecure-resistant, and none were classified as avoidant. The number of infants rated as securely attached increased to 87% when using the "best-fit" ABC classification system, with the remaining 13% rated as insecure-resistant. Attachment security was significantly associated with communication patterns, with secure infant–mother dyads making significantly less communication violations in comparison to dyads classified as insecurely attached. Attachment security was only modestly correlated to maternal sensitivity, supporting the view that maternal sensitivity does not account for maternal behaviors associated with disorganization. A regression analysis demonstrated that the inclusion of maternal frightening or frightened behavior significantly predicted attachment insecurity. The lack of avoidant attachment classifications was a significant departure from previous attachment findings. Characteristics of the caregiving practices in this sample, including constant contact with the infant, nursing on demand in response to hunger and distress, and prompt responses to infant bids for attention, may have contributed to this tendency. It is argued that under the living

conditions observed, mothers could not maintain behaviors that would lead to avoidant attachment, such as rejecting infant bids for attention or displaying aversion in response to contact, as it would place the infant in danger of malnutrition or disease. The condition of separation may also have elicited more distress than intended, as Dogon infants are not generally left by themselves. Infant disorganized attachment was significantly associated with disfluent communication, and their mothers displayed significantly more frightened or frightening behavior.

3.2.3 | South Africa

Minde et al. (2006) conducted a study with 46 Northern Sotho speaking mother–infant dyads from an urban township in Johannesburg, South Africa, using two instruments to assess infant attachment: the AQS and the Working Model of the Child Interview (WMCI; Zeanah & Benoit, 1995). Results from the observer-rated AQS showed only 47% of the sample to be securely attached. According to the WMCI, a measure that evaluates a mother's representation of her infant and their relationship, the authors classified each dyad as securely or insecurely attached. Using the U.S.-developed criteria of the WMCI, only 31% of the sample was found to be securely attached. The authors, in collaboration with a focus group, created a culturally modified scoring system for the WMCI. When these norms were used, 58% of the sample was deemed to be securely attached. There was significant correlation between the attachment classifications of the AQS and the adapted version of the WMCI. For the purposes of this review, the infant attachment classifications derived from the AQS were used. On a measure of psychological adjustment for adults (the Symptom Checklist-90-Revised; Derogatis, 1994), mothers in this sample obtained high scores for anxiety, depression, paranoid ideation, and high global scores, indicating elevated levels of symptomatology. A history of maternal physical or sexual abuse and severe financial difficulties were significantly related to the classification of attachment security. The relatively high rate of insecure attachment may have been a function of the high prevalence of psychiatric symptoms, psychosocial stressors, and lack of partner and social support. Of significance for cross-cultural attachment research was the indication that assessments of attachment that rely on verbal representations of attachment patterns are more sensitive to cultural traditions and influences than is the assessment of parent–child interactions.

The peri-urban settlement of Khayelitsha outside Cape Town has been the site of a large randomized controlled trial evaluating the effects of an intervention on the mother–infant relationship, maternal depression, and infant cognitive development. This study has been the topic of several articles, some of which are included in the current review. A high rate of maternal depression was found among this population—up to three times that of other Western samples (Cooper et al., 1999). In this population, postpartum depression was associated with significant impairment in the mother–infant relationship—most notably less sensitive engagement by mothers and less positive infant engagement. The population comprised individuals who were disproportionately affected by adverse conditions such as low income, poor housing, limited education, unemployment, and lack of partner support.

Despite these conditions, a longitudinal comparison of mother–infant interaction and attachment showed that almost two thirds (61.9%) of the 98 infants assessed by the SSP at 18 months were rated as securely attached to their mothers according to the four-way attachment classification (Tomlinson, Cooper, & Murray, 2005). Relatively low rates of avoidant and insecure-resistant attachments were found, but of concern was that one fourth (25.8%) of these infants were rated as having disorganized attachment. In a "best-fit" model using Ainsworth's original three categories, 72.2% of the infants were rated as securely attached. Of the demographic factors, only a lack of partner support was associated with infant security. Significantly more mothers who were insecurely attached to their infants experienced depression at 2 months' postpartum, but this association was not significant at 18 months. The rate of postpartum depression declined from 34.7% at 2 months' to 12.4% at 18 months' postpartum. Mother–infant interaction was observed at 2 and 18 months, and maternal behavior was rated according to an established scheme developed for an earlier study. At both time points, mothers who were insecurely attached to their infants were rated as significantly less sensitive and more often highly intrusive-coercive in their behavior. Highly remote-disengaged behavior was observed more often at 2 months and was significantly associated with mothers of insecurely attached infants. In a multiple regression model, the relative contributions of maternal behavior and postpartum depression to infant security were evaluated. Maternal sensitivity at 18 months and maternal intrusive-coercion and maternal remote-disengagement at 2 months were all significant predictors of infant attachment security, but the impact of postpartum depression was not significant. To determine the impact of maternal behavior and postpartum depression on attachment disorganization, extreme remote-disengaged behavior was classed as "frightened" behavior and extreme intrusive-coercive behavior as "frightening" behavior. The resultant multiple regression model identified only frightening/frightened behavior at 2 months as predictive of disorganized infant attachment. These findings highlight the importance of early and current mother–infant interaction patterns in determining attachment security, particularly the impact of early maternal behavior in contributing to attachment disorganization, with clear indications for early intervention in at-risk dyads.

A follow-up study in the same community described the results from the randomized controlled trial of an early intervention aimed at improving the mother–infant relationship and attachment security (Cooper et al., 2009). Previous findings identified insensitive maternal behavior during play interaction and intrusive behavior as particularly problematic among this population. Women were randomized to an intervention or no-treatment control group during pregnancy, and they were closely matched on demographic variables. The intervention group received regular home visits by lay counselors. Home visits were initiated during the antenatal period and continued for 5 months' postpartum. The intervention aimed to assist mothers in being more sensitive and responsive in their interactions with their infants, and to reduce the rates of insecure and disorganized attachment. Infant attachment at 18 months, assessed with the SSP using the ABCD scoring system, was one of the primary outcome measures for the intervention. Mother–infant play interactions were assessed for sensitivity and intrusiveness at 6 and 12 months. Mothers seemed to benefit significantly from the intervention, as they were rated as significantly more sensitive and less intrusive than were mothers in the control group after the intervention and at follow-up 1 year' postpartum. The proportion of securely attached infants was significantly greater in the intervention group versus the control group (74 vs. 63%, respectively), with the control group including significantly more avoidantly attached infants than did the intervention group (19.0 vs. 10.9%, respectively). Despite the differences between the two groups, parental variables of sensitivity and intrusiveness were not significantly associated with infant attachment or maternal depressive disorder. The benefit of the intervention to infant attachment security further highlights the importance of early intervention in a population facing significant adversity.

A study from Hanover Park in Cape Town, South Africa was the site of a pilot intervention with infant attachment as the primary outcome measure (Tomlinson, 2001). This community is described as challenged by many sociocultural factors, including high rates of unemployment, gang violence and poverty, and elevated levels of child abuse and neglect. A community-based, long-term intervention was implemented to support parents and the parent–infant relationship. The overall aim was to reduce the incidence rate of child abuse and neglect. Home visits by community health workers started in the first week' postpartum and continued for 2 years. The attachment classifications of 41 mother–infant pairs were assessed when the infants were 2 years old. There were no significant differences in the distribution of attachment classifications between the intervention and control samples. Using the ABC-method of classifying infant behavior, just over half (53.7%) of the infants were rated as securely attached, with almost 30% categorized as avoidantly attached. Tomlinson (2001) noted irregular behaviors in some infants who did not

readily seek contact upon reunion with the mother; however, other behaviors characteristic of avoidant attachment were not present. The author urged caution in extrapolating too much from the results, due to methodological issues. In particular, the SSP was conducted when children were 2 years of age, which may explain some of the unusual behaviors. Naturalistic observations were suggested to validate the findings. Future studies should include the assessment of disorganized attachment and additional interactional aspects such as maternal sensitivity to further expand the use of the findings.

3.2.4 | Uganda

Peterson et al. (2001) set out to study the relationship between infant attachment security and the human immunodeficiency virus (HIV) in the Ugandan capital, Kampala. This country has a high prevalence of HIV infection, and previous research has indicated that maternal HIV infection has significant social and psychological consequences, which may negatively affect the quality of caregiving relationships. According to the World Health Organization, acquired immunodeficiency syndrome (AIDS) may develop in advanced stages of HIV infection, seen as severe clinical manifestations such as infections or cancers (World Health Organization, 2018). Maternal and child health status were both expected to influence the quality of the mother–infant interaction, and factors that correlated to attachment security also were assessed. HIV-positive mothers were divided into two groups—those with infected infants ($n = 10$) and those with uninfected infants ($n = 25$). Both groups were compared to noninfected dyads ($n = 25$). The socioeconomic status of participants was in the low-to-middle rating, which meant that most lived in houses constructed with mud or cement, with corrugated iron roofs. There was no electricity in these residences, and water was obtained from a standpipe in the compound. Infants ranged between 20 and 30 months of age. Security of attachment was assessed by means of the AQS, which was completed by an observer. Cultural validity was established by conducting a pilot observation of 10 infant–mother pairs, which concluded that the behaviors demonstrated by Ugandan dyads were similar to those of the Q-sort.

Contrary to the expected results, HIV-infected mothers had similar rates of secure attachment to their infants as did noninfected mothers. The HIV-infected mothers also displayed a similar frequency of positive interactions and affect as did their noninfected counterparts. Interestingly, most of the infected mothers chose not to know their own or their infant's HIV status, which may have mitigated the stressful impact of the diagnosis prior to developing significant physical complaints and may have contributed to the apparent lack of difference between the two groups. Infants of mothers with AIDS were more likely to be insecurely attached to their mothers than were infants whose mothers did not have

AIDS. In addition, maternal AIDS was associated with less positive affect and fewer positive interactions than was HIV-infected mothers who did not exhibit symptoms of AIDS. HIV infection in infants was associated with more insecure attachment. Infected infants demonstrated less positive affect and had more AIDS-related symptoms than did noninfected infants. These results may point to the detrimental effect of physical illness on the quality of mother–infant interaction. A regression analysis pointed to maternal affect being the most influential determinant of attachment security. This study provides encouraging findings that HIV infection, in the absence of AIDS symptoms, may not pose significant risk to the mother–infant attachment relationship. In addition, infants with HIV may need early intervention to mitigate the effects of the disease on their socioemotional development.

3.2.5 | Zambia

In the first study to utilize the SSP in Zambia, Mooya, Sichimba, and Bakermans-Kranenburg (2016) examined the attachment patterns of infants in relation to both their mother and a sibling. Older siblings form a significant part of infant caregiving in Zambia, and the authors set out to determine if this arrangement led to attachment relationships and, if so, how this may be related to maternal attachment.

Families were recruited from two low-income, high-density townships in Lusaka, the capital of Zambia. Housing is described as fabricated from concrete and mortar, with corrugated iron roofing, built closely together and small. Occupants typically include single parents, an average of four children, and two members of the extended family. Attachment results are available for 41 mother–infant pairs and 43 sibling–infant pairs. Siblings ranged from 7 to 13 years old, and all attended primary school. Sibling caregivers were reported to be involved in a range of caregiving activities 5.1 times per week, on average, but no other information about the length of time spent caring for infants is available. Infant attachment to the mother and sibling was assessed by via the SSP, and the three- and four-way classifications were reported.

Using the three-way classification, 59% of mother–infant pairs were rated as securely attached, with one quarter (24%) classified as avoidant and 17% as resistant. In contrast, the rate of secure attachment declined to less than half (46%) when the four-way classification system was employed whereas over one fourth (29%) of the sample was rated as disorganized, 20% as avoidant, and 5% as resistant. In a three-way classification of sibling–infant attachment, only 42% of the sample was classified as securely attached, with the remaining proportion distributed as 23% avoidant and 35% ambivalent. The number of infant–sibling pairs rated as securely attached declined to 35% when the four-way classification was used, while one third (33%) was classified as disorganized, 23% as avoidant, and 9% as ambivalent. Although this study demonstrates that infants in Zambia form attachment relationships to both their mothers and siblings, attachment security within the same family showed no significant associations.

A limitation of this study is that the duration and frequency of sibling caregiving was not described, making it difficult to determine if there was wide variability within the sample. The fact that all infants formed a type of attachment with their mothers provides further support for the universality hypothesis. Overall, the first Zambian study to examine the infant–sibling attachment relationship with the SSP has provided valuable insights into the distinct and unique nature of attachment to specific relationships.

4 | DISCUSSION

4.1 | Scarcity of African attachment studies

Knowledge pertaining to infant attachment in the African setting is still sparse, despite recognition of the need for greater diversity in research on infant attachment. The African continent encompasses 54 separate states and countries, yet infant attachment has only been quantitatively assessed in 5 countries: South Africa (four studies), Kenya (two studies), and Mali, Uganda, and Zambia (one study each). Most of the eligible studies were published after 2001, with only one study from 1986. This possibly indicates a growing effort to describe the diverse caregiving practices and early relationships in Africa.

4.2 | Psychosocial risks and attachment patterns in Africa

There is convincing evidence that psychosocial factors, including low socioeconomic status, pose a significant risk to infant development. A recent meta-analysis of factors affecting attachment security in high-risk samples has found that the cumulative effect of socioeconomic risk factors poses as significant a risk for attachment insecurity and disorganization as maltreatment by a parent (Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010). Most studies included in this review were from dyads living in peri-urban, township, or slum areas. The terms *township* and *slum* were used to identify areas of informal or improvised housing, often associated with overcrowding and overpopulation, significant socioeconomic difficulties, and squalor. One study recruited participants from an urban setting according to health status (Peterson et al., 2001), and from the description of participants' socioeconomic status, it was inferred that dyads lived in informal housing, arranged in a compound. Only two studies were conducted in rural settings: one in an isolated demographic area that is home to a traditional agrarian tribe (the Dogon) and the other among a social hunter–gatherer tribe (Gusii).

The presence of socioeconomic risk factors poses a threat to attachment security, with the risk for attachment disorganization increasing when multiple risk factors are present (Cyr et al., 2010). Several studies in this review have identified multiple socioeconomic factors that affected the living conditions of the populations under examination. In particular, unemployment, financial difficulties or a low income, low levels of education, poor-quality or unstable housing, being a single parent, lacking the support of a partner, being an adolescent mother, the presence of substance abuse, and depression are all factors associated with more significant risk to the caregiver–infant attachment relationship. Most communities reported on in this review experienced at least one, and in many cases several, of these risk factors. The precise contribution of each of these factors to the climate of caregiving is unclear, but it may be inferred that the parents, caregivers, and infants who live under adverse conditions are exposed to significant psychological stress, which presumably impacts on the quality of the infant's attachment relationships and subsequent development. In addition, the mothers or caregivers who contend with this level of adversity and associated uncertainty are more challenged when required to respond in a sensitive, caring, and attuned manner to an infant who requires their attention.

Despite significant adversity in living conditions, relatively high rates of secure attachment were found in the majority of studies included in the current review. This may correspond to the suggestion by Zevalkink, Riksen-Walraven, and Van Lieshout (1999) that mothers who develop secure attachment to their infants have the ability to create a safe environment amid adversity, unpredictability, or turmoil, facilitating the healthy socioemotional development of their children. In an effort to identify protective factors that may assist parents in creating such environments or overcoming particular challenges, it would be pertinent to consider factors that pose some overlap within the continent. One possible protective factor is the notion of *Ubuntu*, a concept common to all African traditional cultures. Berg (2003) described this concept in terms of a Xhosa proverb (*Umtu ngumtu ngabantu*), meaning "A person is a person because of another person," which embodies the centrality of compassion for others and a sense of community among individuals. The self is seen in relation to the broader community, and personal development is marked by rituals that involve the community within which they live. Another philosophy common to most African societies is that "it takes a village to raise a child" (Mooya et al., 2016). The infant is thought of as belonging to the community, and the well-being of the children within that community is considered a collective responsibility (Tomlinson et al., 2005).

On the other hand, relatively high levels of disorganized attachment were found in several of the studies (Mooya et al., 2016; Tomlinson et al., 2005; True et al., 2001). In fact, only one study that included this category has cited a rate lower than 25%. The examination of disorganized attachment behavior is of importance, as it is one of the early indicators of later psychopathology (Lyons-Ruth & Jacobvitz, 2008). The presence of maternal frightened or frightening behavior is associated with unresolved maternal loss or trauma and may be associated with a maternal history of childhood abuse or trauma (Tomlinson et al., 2005). There is ample evidence for the association between maternal frightened or frightening behavior and disorganized attachment (Lyons-Ruth & Jacobvitz, 2008), a phenomenon that also was observed in the two studies that assessed for that type of maternal behavior (Tomlinson et al., 2005; True et al., 2001). The presence of prominent psychosocial stressors caused by social adversity or the presence of HIV may be of concern to the mother and may affect how available and sensitive she is able to be.

Another interesting observation was the apparent lack of avoidant attachment patterns in Mali (True et al., 2001) and the relatively low rate thereof in Khayelitsha, South Africa (Tomlinson et al., 2005). Possible explanations offered by the authors include caregiving and handling patterns such as feeding on demand, carrying or wearing the infants, being in almost constant proximity to the infant, and close sleeping arrangements. It is argued that these practices do not lend themselves to the patterns of caregiving usually associated with avoidant attachment, such as rejection of attachment bids and a lack of availability or close physical contact. The living arrangements described in the communities with low avoidant attachment point to the infant being in close proximity to the mother for substantial portions of the day—either due to the tendency for infants to be carried or the confined living spaces. The mother is also physically available to her infant at night, as infants often sleep in close proximity to the parent. The practices of breast-feeding on demand and offering the breast when an infant is in distress were common among many of the communities described. True et al. (2001) described breast-feeding as the dominant strategy to comfort infants and the primary manner in which infants seek comfort. Ainsworth also discussed this pattern among the infants from Uganda, where the sources of nourishment and comfort and the attachment figure were the same person—a practice that may further make it difficult to develop avoidant attachment styles of interaction. True et al. considered this practice of nursing on demand in response to hunger, tiredness, or stress as intermittently reinforcing an infant's attachment bids. Interestingly, the only preweaned infants who were classified as avoidant by Kermoian and Leiderman (1986) were those whose mothers did not breast-feed them. Several studies have described the carrying of infants—either on mothers' backs (Khayelitsha) or in the arms of mothers or child caregivers. A study of the use of infant carriers by Anisfeld, Casper, Nozyce, and Cunningham (1990) has noted a significantly lower rate of avoidant attachment among mothers who used infant carriers. It appears that being in close physical proximity and thus

being readily accessible and available to the infant, feeding on demand for nourishment and soothing of distress, and carrying infants all seem to be practices followed by communities with relatively lower rates of avoidant attachment.

The quality of the mother–infant relationship is adversely affected by maternal psychiatric symptoms and social adversity (Murray & Cooper, 1997). Under conditions of social adversity, the impact of maternal depression appears particularly potent, as infants exposed to both conditions display a range of disturbances in interactional behavior (Murray, Fiori-Cowley, Hooper, & Cooper, 1996). Clinical indicators of psychiatric symptoms were assessed in only three of the studies included in this review. All three studies were based in South Africa and included mother–infant pairs living in peri-urban or township settlements. The study by Minde et al. (2006) assessed a range of symptom patterns and found elevated rates of anxiety, depression, and paranoid ideation, but did not examine correlations with attachment security. Cooper et al. (2009) assessed maternal depressive disorder and maternal depressive symptoms, but these were not significantly associated with infant attachment security. Tomlinson et al. (2005) also assessed maternal depressive disorder and found that maternal depression at 2 months' postpartum significantly predicted infant attachment security at 18 months. All three studies reported factors related to socioeconomic adversity, which may have contributed to the presence of psychiatric symptoms in general, and maternal depression in particular.

4.3 | Methods relevant to African studies

In all but two studies, there was a relatively small number of participants ($n = <100$). The exceptions were the large randomized controlled intervention trial conducted by Cooper et al. (2009) and Bryant et al.'s (2012) description of community health workers' assessment of attachment within the primary care setting. Five of the studies reflected the assessment results of no more than 46 participants. This is not a surprising trend, as many cross-cultural assessment studies are in-depth and relatively small, often including a longitudinal component and requiring significant adaptation (van IJzendoorn & Sagi-Schwartz, 2008). Nevertheless, given the magnitude of the continent's population and the variety of cultural groupings, the generalizability and representativeness of these findings to Africa as a whole may be limited. Given the widespread health concerns, including the prevalence of HIV and relatively high rates of infant mortality and postpartum depression, it is not surprising that three of the studies incorporated the assessment of infant attachment as part of early interventions.

The SSP was the most prevalent method used to assess infant attachment security, and one study described a separation and reunion paradigm that adapted the SSP to a rural setting. The AQS was used in two studies, with one study using an attachment scoring system derived from the Circle of Security and administered by community health workers. Use of the AQS was preferred in Uganda, as a naturalistic observation method was determined to be more accessible to the population studied. A meta-analysis of AQS studies determined the observer method to be a valid assessment of attachment (van IJzendoorn et al., 2004). The continuous score yielded by the AQS provides an indication of degree of security of attachment, which does not take disorganized patterns of attachment into account. The attachment scoring system used in the Kenyan study (Bryant et al., 2012) was designed to identify behaviors consistent with secure and insecure attachment. This method served to identify dyads potentially at risk and was not intended to provide a diagnostic classification of attachment. The substantial differences among the assessment measures used need to be taken into consideration when comparing the results.

Of the six studies that used the SSP, five reported attachment classifications using the ABCD coding method, three used the ABC best-fit coding method, one reported only the ABC coding, and the remaining study (that used the adapted SSP) only reported secure/insecure distributions. The remaining studies utilized alternative assessment tools. Two reported secure/insecure frequencies, and one study described attachment only as a correlation between the ratings of prototypical secure attachment behavior and the ratings of observed behavior between mother and infant. The SSP is considered a laboratory-based assessment, and all studies that used this measure were conducted outside the home, except for the study that adapted it to the rural setting and was conducted outside the mother's hut on a mat (Kermoian & Leiderman, 1986). One study conducted the SSP outside the research laboratory, as it was deemed to be a more acceptable setting (True et al., 2001). All three studies not utilizing the SSP were conducted during home visits.

The impact of a laboratory setting on attachment behaviors should be considered, especially in rural settings where exposure to Westerners and unfamiliar adults may not be frequent. All but one of the studies employing the SSP used a laboratory setting to assess attachment, operating from the premise that the attachment behavior observed in the experimental context reflects a culmination of the child's actual experiences with that attachment figure (Tomlinson, 2001). Although this assumption is widely held, there is room for additional studies comparing the results from attachment assessments in laboratory settings to those occurring naturalistically.

One study adapted the SSP to a rural setting and also included an assessment of child caretaker attachment (Kermoian & Leiderman, 1986). Assessments of the attachment of Gusii infants to their mothers and child caretakers were recorded on mats outside the mothers' huts. The procedure was as follows: An infant was initially observed

alone on the mat, then approached by his or her mother, who would engage the infant in interaction. A separation would take place and if the infant was distressed on reunion, he or she would be comforted, and the mother would again try to engage him or her in interaction. This was repeated with the child caretaker and with a stranger (a Gusii adult unknown to the infant). Although the procedure differed from the SSP, the design allowed for comparison of behavior toward all three figures, with increased levels of arousal. The SSP procedure in the rural context of Mali was adapted after being piloted with two mother–infant pairs (True et al., 2001). The SSP was conducted outside in a courtyard, with the recording equipment and cameraman both hidden from sight. Coding of the SSP was adapted to include breast-feeding as physical contact, as this is the primary way that mothers soothe distressed infants and in which infants look for comfort. Cultural bias in the rating of coders for maternal sensitivity was mitigated by employing behavior-based rating scales which were devised in collaboration with a Malian psychiatrist and researcher.

One potential criticism of using the SSP as a means of assessing infant attachment is that infants from different cultures may attribute different meanings to the separation and presence of a stranger, possibly due to lack of prior exposure. The question arose whether infants' primary appraisals of the Strange Situation are comparable and if the instrument is valid in cross-cultural settings. In a cross-national comparison, Sagi, van IJzendoorn, and Koren-Karie (1991) evaluated results from six countries and concluded that despite cultural differences, they could not confirm the notion that the meaning of the Strange Situation and the primary appraisal of infants to the procedure differ in different countries. However, they found that Israeli infants from kibbutz samples appeared to respond relatively more anxiously than did infants from other cultures. This may be related to the fact that these infants tend to have less exposure to strangers than do infants from other cultures and therefore may be more alert to their presence. These comparison data do not include any data from Africa, where infants may be similarly unexposed to unfamiliar adults. In particular, Dogon infants are rarely left alone, which may indicate that the separation episode of the SSP is potentially creating more than mild distress for these infants (True et al., 2001). In contrast, infants from the Hanover Park study are described as frequently exposed to unfamiliar adults, which may have decreased the stress evoked by the presence of a stranger (Tomlinson, 2001).

4.4 | Nonparental attachment figures

Although the attachment networks of most cultures in the world include nonparental attachment figures, only two studies have assessed infant attachment to nonmaternal individuals. Less than half (42%) of Zambian infants were securely

attached to their siblings, with 23% rated as avoidant and 35% as ambivalent, according to the ABC classification (Mooya et al., 2016). Considering the four-way classification, the proportion of securely attached infants decreased to 35%, and the ambivalent category decreased to 9%. One third (33%) of the infants were classified as disorganized in their attachment to their siblings whereas the avoidant proportion remained unchanged. Just over half of Gusii infants were rated as securely attached to their child caretakers (Kermoian & Leiderman, 1986). These two studies both made use of the SSP. The assessment of sibling attachment occurred at least 2 months after the mother–infant assessment to minimize memory effects (Mooya et al., 2016). Kermoian and Leiderman (1986) repeated the adapted SSP at least 3 months after the initial assessment to determine stability of attachment classification. Notable in both studies was that infants' security of attachment to their mother was not significantly associated with the security of attachment to their child caregiver. Given the prevalence of nonmaternal caregiving, there is room for further research to explore the nature of caregiving practices by alternative caregivers and how this contributes to the psychosocial development of infants.

4.5 | Emergence of culture-specific beliefs and practices

Parenting behaviors and strategies are the mechanisms by which cultural values and practices are transmitted from generation to generation, with significant cultural and contextual variation (Keller et al., 2004). Marvin, VanDevender, Iwanaga, LeVine, and LeVine (1977) posited that different cultures adapt to factors within their environment and social structures through specific caregiving practices, and despite variations in the organization of the environment and caregiving responsibilities, all cultures have adapted to ensure the survival of infants. Spicer (2011) also highlighted that the infancy period is associated with uncertainty and anxiety related to the infant's survival, and that the physical health and survival of their children appear to be a priority for parents worldwide.

Among the Gusii, mothers are described as not displaying a lot of affection so that they do not create jealousy in others (Kermoian & Leiderman, 1986). Kermoian and Leiderman (1986) also observed distinct behavioral patterns among the Gusii infants and caregivers. Infants are typically greeted with a handshake, and the infants appeared to anticipate this greeting, much like "American infants anticipate a hug" (p. 460). Infants classified as secure would reach toward the adult with one arm, with insecure infants turning away, or reaching and pulling away after contact was made with the caregiver. Infants' exploration of their environment is described as primarily visual rather than manipulative. Distinct patterns of visual exploration were observed in securely

attached infants, who differed in their exploration with or without the presence of the attachment figure. From an early age, Gusii infants are trained to remain on a mat; during the experimental procedure, not a single infant left the mat when in the company of another person. When the infants were alone, some left the mat to search for the attachment figure after a long hesitation. The infants' motor development was described as more advanced than that of their American counterparts, with many of the 8-month-old infants crawling or walking.

Dogon infants are in almost constant contact with an adult, especially in the presence of an unfamiliar person. It was reported that some African cultures, including the Dogon and the Gusii, disapprove of direct eye contact between individuals who do not hold equal status, including children and their parents (True et al., 2001). Dogon infants were described as more passive than were the samples from other countries— they did not crawl toward their mothers on reunion as readily. Much like the lack of independent movement of the Gusii infant, the Dogon infant does not generally roam freely in the compound due to dangers such as open cooking fires, snakes, and animal droppings. The infants also frequently used breastfeeding as a method of maintaining contact after experiencing the stress of separation.

4.6 | Revisiting the four hypotheses

The results reported in this review provide support for the universality hypothesis, with considerable similarities in the distribution of attachment classifications as compared to global distributions. In addition to maternal attachment, many infants were shown to become attached to caregivers other than their mothers. The normativity hypothesis was also supported, as the secure classification was reported as the predominant category in all but one of the studies reviewed. Although maternal sensitivity was only reported on in three studies, there was a modest correlation between infant attachment security and maternal sensitivity among the Dogon infant–mother pairs (True et al., 2001). Cooper et al. (2009) reported that mothers in their intervention group displayed greater sensitivity and that this group had a larger proportion of secure attachment classifications at 18 months than did those who did not receive intervention. Infant attachment security and maternal sensitivity at 18 months were significantly associated in the study by Tomlinson et al. (2005). There were limited findings to evaluate the competence hypothesis, and there were no longitudinal evaluations of areas of competence beyond assessment of attachment. However, Kermoian and Leiderman (1986) found that secure attachment to the mother was associated with nutritional status whereas attachment to child caregiver was associated with the indices of cognitive development, pointing to the significance of the specific activi-

ties in which the infant engages with each attachment figure. Bryant et al. (2012) found an association between insecure attachment and a lower weight for age among the infants and children assessed.

5 | CONCLUSION

The African continent is home to a rich and diverse range of cultures, yet there remains a significant paucity of attachment studies since Ainsworth first published her observations from Uganda over 50 years ago. Of a total of 54 countries, only 5 countries had at least one article published on mother–infant attachment.

Most of the African populations among whom attachment was quantitatively assessed have one or more psychosocial stressors that place pressure on the early mother–infant relationship. Despite the adverse conditions that these dyads experience, secure attachment was relatively widespread. The distributions of attachment classifications were markedly similar to that of the global distribution of attachment. Although not all studies included assessment for disorganized attachment, relatively high rates were reported in all but one study where this category was included. Disorganized attachment was shown to correspond to the presence of frightened and/or frightening maternal behavior, which is in line with available literature. Some populations appear to have relatively low rates of avoidant attachment.

Although some studies have attempted to adapt the Western assessment measures, this was not true for all studies. Assessment of attachment requires sensitivity to cultural variances in acceptable behavior and expectations for development. Additional work is necessary to include more nuanced descriptions and explorations of factors that create the context for attachment relationships as well as the assessment of maternal and child factors that contribute to attachment security. It may be useful to include more naturalistic observations that consider the variety of factors the dyad experiences to fully appreciate the factors contributing to mother–infant attachment.

While there has been a significant proliferation in crosscultural attachment literature since Ainsworth's original 1967 study, Africa remains an understudied continent. The cultural diversity of this continent may still hold several important truths necessary for understanding the complex relationship between an infant and an attachment figure.

CONFLICT OF INTEREST

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

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Chapter 3: Literature Review – Attachment, Parental Reflective Functioning and Maternal Caregiving in Context of Psychosis

Introduction

The preceding chapter contained a review of studies of attachment during infancy conducted in Africa since Ainsworth's Ugandan study that was published in 1967. There has been a limited number of studies of mother-infant interaction in Africa. Secure attachment was relatively widespread among the mother-infant dyads studied in the review, despite the prevalence of psychosocial stressors. The review included four studies from South Africa, but the only psychiatric condition of focus was postpartum depression. Mothers with severe mental illness, in particular those who experience symptoms of psychosis, may be at risk of developing relational difficulties with their infants.

The overall aim of this chapter is to provide an overview of parental reflective function in the context of severe mental illness. Several concepts will be addressed. The first section of the chapter will provide an overview of attachment theory, which acts as the guiding framework for the study. The following section will focus on comparing and contrasting current cognitive and attachment theories as they relate to psychosis. Thereafter, the origins and theoretical underpinnings of reflective function will be described, and the concept of reflective function will be defined in the context of attachment theory. A review of the current literature that describes reflective functioning in populations with psychosis will be provided. Thereafter, studies examining the interaction quality among mothers with psychosis is reviewed. Ultimately, the chapter places the focus on parental reflective function and the interaction quality of mothers who have had psychotic experiences. Finally, gaps in the current body of knowledge will be identified and suggestions for areas of further studies will be provided.

Brief Overview of Attachment Theory

Attachment theory can be regarded as a framework to conceptualize the development of one's ability to understand social dynamics and interpersonal relationships. John Bowlby (1982) developed attachment theory through observations of young offenders and later of infants regarding the significance of separation from their primary caregiver. Attachment behaviour is conceptualised as "… any form of behaviour that results in a person attaining or retaining proximity to some other

differentiated and preferred individual, who is usually conceived as stronger and/or wiser" (Bowlby, 1977, p. 203). Through recognition that separation causes intense distress even when physiological needs are met, Bowlby began his investigation of the nature and development of an infant's attachment behaviour towards a primary caregiver (Cassidy, 2008). He proposed the presence of an attachment behaviour control system that develops as a result of evolutionary processes to promote the infant's survival. Bowlby's proposition is that an infant's observable behaviour is organised around the goal of maintaining proximity to attachment figures, which constituted the central mechanism through which infant survival is promoted.

From birth, the infant's signal and motor systems function so as to prompt interest and caregiving from other humans (Marvin & Britner, 2008). Caregiver responses include proximity, physical contact, nutrition, and warmth, all of which are necessary for the infant's survival. Under optimal conditions, all infants will form an attachment to a consistent caregiver (Sroufe, 2017). This affectionate bond between an infant and his primary caregivers, develops within the context of complementary behaviour between infant and caregiver and serve to shape the infant's developing capacities for affect regulation, interpersonal functioning and mentalising (Gojman-de-Millan et al., 2017).

During infancy, affect is regulated by the attuned presence and sensitive responsiveness of caregivers. An infant's attachment behavioural system would be activated when experiencing danger or potential danger, such as when fatigued, hungry, or in unfamiliar surroundings (Lyons-Ruth & Jacobvitz, 2008). The caregiver's presence, which provides a safe haven for the infant, may be required for the infant's attachment behaviour to come to an end. During times when the environment is deemed to be safe and the caregiver's presence is known, the infant is able to explore the environment, using the caregiver as their secure base. The infant's behavioural control system balances the infant's attachment and exploration of their environment (Posada & Trumbell, 2017). Over time, these interactions facilitate the development of a secure attachment.

Bowlby (1977) hypothesised that a representational framework develops through repeated experiences with caregivers, which he termed an Internal Working Model (IWM). This IWM is a set of beliefs and expectations about attachment to caregivers and provides a framework for understanding oneself in relation to interpersonal interactions.

Bowlby (1982) proposed that the development of attachment occurs in four phases, three of which occur in the first year of life (Marvin & Britner, 2008). During the first phase, ranging from birth to around 8 to 12 weeks, the infant responds to others in a characteristic way by orientating towards the person, tracking with his eyes, grasping, reaching, smiling, and babbling. These responses are likely to result in the caregiver spending more time with the infant. His or her ability to discriminate between people, however, happens only through sound and smell. In the next phase, from around 12 weeks of age, the infant shows an increase in the friendly responsiveness as well as differential responsiveness towards a primary caregiver. From around six months, the third phase becomes evident, when the infant becomes increasingly discriminating towards a preferred individual and other individuals may also be identified as subsidiary attachment figures. His behaviour becomes more cautious around strangers, whose presence may elicit alarm and withdrawal. The infant's increased locomotive abilities allow them to follow a departing mother, greet her when she returns and he is able to use her as a secure base from which to explore. This phase continues into the second and third year of the infant's life. During the fourth phase, the infant becomes aware of the mother-figure as an independent object whose motivations underlying her behaviour is at first unclear. From observing her behaviour, the infant starts to make inferences about the motivations underlying her behaviour. This marks the beginnings of developing insight into the feelings and motives and lays the groundwork for a more complex social relationship, which is hypothesised to begin around the middle of the third year.

Bowlby (1980) proposed that extended early separation from one's mother (later expanded to primary caregiver) constitutes a significant threat to the attachment system. Other events that threaten the security of the attachment bond include trauma, neglect, and other losses.

Infant Attachment Classification

Ainsworth, in her studies of mother-infant interaction in Uganda and Baltimore, classified the behaviour of infants using the Strange Situation Procedure (SSP). This procedure consisted of brief periods of separation from and reunion with a caregiver, in the presence and absence of a stranger. Ainsworth identified three distinct patterns of infant behaviour upon reunion with the caregiver which she termed secure, insecure ambivalent (also termed 'resistant') and insecure-avoidant. The caregiver's sensitivity and responsiveness appear to be critical factors in determining which type of attachment the infant will develop (Marvin & Britner, 2008). A securely attached infant is able to use his caregiver as a secure base, displays signs of missing the caregiver upon separation, and when soothed upon their return, is able to resume play. Infants who have an ambivalent attachment pattern

are seen to express their affective states more intensely, are more reluctant to explore and display more clinging behaviour. These infants have a need for contact seeking, while also displaying anger and the return of the caregiver fails to soothe their distress. These behaviours develop from inconsistent responses from caregivers and as a result the child tends to exaggerate negative affect in order to elicit a response. Caregivers of infants who are classified as avoidantly attached, tend to be consistently unresponsive, which leads to a deactivation of the attachment strategies of their infants. These infants appear to show minimal displays of affection and a tendency to direct their attention towards objects, with less interest in their caregivers upon their return. Main and Hesse expanded on Ainsworth's classification by adding disorganised (also termed disoriented) attachment category for infants whose behaviour was not classifiable according to the three original categories (Hesse & Main, 2000). These infants display a range of anomalous behaviours that appear inexplicable, odd, and conflicted. Although there is much variation in the behaviour of infants classified as disorganized, they all appeared to lack an organised strategy to deal with the stress of separation. A common pattern observed, is that the infants appear to have contradictory intentions, or display apprehension about approaching the caregiver.

Studies of infant attachment span the globe, but there is a predominance of literature from developed countries (Tomlinson et al., 2014). Previously, our research group conducted a review of infant attachment studies from Africa and found a relative lack of studies from the continent (Voges et al., 2019). Since Mary Ainsworth's observational study of the mother-infant interaction in Uganda in the 1950s, only nine studies on infant attachment security in Africa have been published (Ainsworth, 1967; Voges et al., 2019). These nine studies represented research from only five countries on the continent of Africa. The review found that secure attachment classifications were widespread, despite parents needing to contend with one or more psychosocial stressors. Distributions of attachment classifications appeared similar to that of global distributions. While there is an acknowledgement that cross-cultural studies of attachment are an important avenue of study, Africa remains an understudied continent.

Although the assessment of attachment security originated from Ainsworth's work with infants, the theoretical framework is one that attempts to define the development and maintenance of attachments throughout the life course. Attachment security has been associated with a number of developmental, health and mental health outcomes from infancy to adulthood (Cassidy et al., 2013; Mikulincer & Shaver, 2012). Insecure attachment has been suggested as a non-specific risk factor for

psychopathology, as it has been associated with a range of psychiatric disorders, including psychotic disorders (Berry et al., 2007).

Adult Attachment Classification

There have been two avenues of research on adult attachment which developed from utilising different assessment strategies. One school of thought developed from applying a narrative approach to determine the attachment representations from recollections of earlier experience and the other utilised self-report assessment.

Narrative Approach to Adult Attachment

The gold standard for evaluating adult attachment via a narrative format remains the Adult Attachment Interview (AAI), which was first developed by George, Kaplan and Main in 1984 (Hesse, 2008). This semi-structured interview asks the interviewee to describe aspects of their childhood experiences with a focus on early relationships with caregivers and to reflect on how it impacted their development. Transcripts of the interviews are then coded and categorised into three categories; namely, secure-autonomous, dismissing, and preoccupied. In their longitudinal study of 40 children and their parents, Main and colleagues (1985) found a correspondence between the children's attachment classifications on the SSP at infancy and that parents' attachment classification according to the AAI. Transcripts of adults classified as secure-autonomous display a valuing of attachment relationships and experiences, while appearing to maintain objectivity. The infants of these parents displayed attachment security in relation to them. Adults with a dismissing style tend to devalue or dismiss attachment experiences and impress as being cut off from these experiences. This attachment style was associated with insecure-avoidant responses by their infants. Adults classified as preoccupied tended to appear fixated on early attachments or attachment-related experiences and were associated with infant insecure-resistant (ambivalent) classification on the SSP. Two additional categories were later added; namely, disorganised (or unresolved) and cannot classify (Hesse, 2008). Transcripts of adults classified as unresolved or disorganised display evidence of an unresolved loss or abuse which leads to a striking lapse in reasoning or discourse. Transcripts that show evidence of contradictory insecure patterns of recollection are categorised as cannot classify (also termed unorganised).

Self-report Approach to Adult Attachment

Self-report measures were developed to simplify and shorten the time and resources needed for measuring attachment in adults. Although there is variation in the focus of self-report measures, many utilise a dimensional approach. Two approaches will be briefly discussed. The first model conceptualises attachment in terms of cognition, using a model of self vs. a model of others. The second approach conceptualises attachment in affective-behavioural terms (attachment anxiety vs. attachment avoidance) (Berry et al., 2007).

Hazan and Shaver (1987) were the first to apply an attachment framework to the study of adult romantic and close relationships. They found three styles of adult attachment that corresponded to the infant attachment styles of secure, avoidant, and anxious/ambivalent. A four-dimensional model was subsequently proposed by Bartholomew and Horowitz (Bartholomew & Horowitz, 1991) to categorise the attachment patterns of adults. Their model proposed that one's internal working models of relationships can be understood from the point of view of one's sense of self and one's image of others, both dichotomised as either positive or negative. This led to their proposal of adult attachment classifications as secure, preoccupied, dismissing or fearful. Adults who are securely attached value close personal relationships, display autonomy and are able to reflect on and explore painful feeling states. Adults with a preoccupied attachment style, appear more preoccupied with attachment experiences and also express their emotions more intensely. Adults with a dismissive strategy exhibit a minimising or avoidance of attachment-related experiences, thoughts, and memories. Those with a fearful attachment style are generally socially avoidant and fearful of intimacy.

While the above categorical model has been widely utilised and adapted to several self-report measures, a dimensional approach is most frequently used with clinical populations. Brennan, Shaver and Tobey (1991) documented an association between Hazan and Shaver's model and that of Bartholomew and found two underlying dimensions for adult attachment; namely, 'anxiety' and 'avoidance'. *Attachment anxiety* reflects a negative sense of self, a fear of rejection and high levels of negative affect. *Attachment avoidance* is associated with a negative evaluation of others, defensive minimisation of affect, interpersonal hostility and social withdrawal. (Bartholomew & Horowitz, 1991; Ravitz et al., 2010).

Narrative or interview-based and self-report assessment of attachment reflect differing approaches in applying the concepts and theoretical background of attachment theory, each with their own

advantages and disadvantages. Where interview techniques have strong predictive validity, they require a high level of skill and training to apply and take much longer to complete. Self-report measures are easier to administer, but may be subject to biases that originate from the attachment of the person completing the assessment (Gumley et al., 2014). Despite previous reports of a weak association between the AAI and self-report measures (Roisman et al., 2007), a systematic review by Gumley and colleagues (2014) reported similar effect sizes from both AAI and self-report studies in populations with psychosis.

In the following section, the current attachment perspective on the development of psychosis will be discussed. Subsequently, the development of reflective function and parental reflective function will be examined.

Attachment and Psychosis – A Developmental Psychology Framework

A developmental psychology framework, which includes attachment theory, may serve to help the understanding of the development and maintenance of psychosis. Attachment theory has been described as a model of resilience (not psychopathology) and may be useful in formulating an individual's affective, cognitive and interpersonal functioning (Gumley et al., 2014). The theoretical model acknowledges the individual's environmental context, which includes the family of origin, taking into account the social, economic and cultural framework within which to understand the person with psychosis. Many of the psychosocial factors that are causal in the development of mental health disorders are also pertinent to the development of attachment security (Read & Gumley, 2008). Through the acknowledgement of the critical importance of the socio-emotional context within which an individual develops, attachment theory may aid in understanding how adverse developmental experiences and stressful life events may contribute to an individual's vulnerability to develop psychosis. Suboptimal caregiving experiences that precipitate the development of an insecure attachment style are associated with emotion regulation difficulties, poorer interpersonal functioning and negative cognition regarding the self and others (Mikulincer & Shaver, 2012). Negative beliefs about oneself and of others may increase the individual's vulnerability to develop psychosis (Quijada et al., 2012).

Read and Gumley (2008) suggest that attachment theory may cast light on the association between childhood adversity and psychosis in three ways. Firstly, through cognitive processes and

mentalisation, affect dysregulation and impaired or non-existent relationships. Cognitive models emphasise the importance of beliefs and schemas in a person's mental health and interpersonal functioning. Negative schemas are hypothesised to develop from childhood adversity, in particular difficulties in early caregiving relationships with significant others and from later interpersonal traumas (Berry et al., 2008). These schemas give rise to negative beliefs about oneself and others. Individuals who experience early adverse events may develop a belief that they are vulnerable or defective. Negative beliefs about others may involve having negative expectations of how others will treat them, that others are a source of threat and may include thoughts such as "I can't trust other people". These negative beliefs adversely affect the individual's interpersonal functioning and self-image. Negative schemas, interpersonal difficulties and poor self-image may increase an individual's vulnerability to psychosis as well as facilitate the development and maintenance of psychotic symptoms.

Berry and colleagues (2007) highlight similarities between attachment's internal working models and cognitive models of psychosis. Concepts of cognitive schemas and internal working models share many features; they are both hypothesised to "guide attention, generate expectations, and influence interpretations of new experiences on the basis of stored constructions of past interpersonal interactions" (Berry et al., 2007, p. 465). In addition to the cognitive element, internal working models are thought to include the emotional states that are included in interpersonal interactions. Both constructs play a role in the development of social cognition, but internal working models may provide insight into how different types of interpersonal relationships shape the individual's beliefs about themselves and others. Beliefs related to a sense of unworthiness and a lack of reliability of relationships with others, underlie the internal working models of individuals with insecure attachment. A review of studies of self-esteem consistently found low self-esteem and negative self-schemas in individuals with persecutory delusions (Kesting & Lincoln, 2013).

There is an increasing acknowledgement that early adverse experiences are associated with the development of psychosis (Stilo et al., 2017; Varese et al., 2012). One possible explanation, proposed by Bentall and colleagues (2007), is that psychosis arises when an individual who has a pre-existing vulnerability to the condition experiences a number of adverse life experiences. Early adverse experiences and traumatic life events, which include forms of abuse, immigration and parental separation, appear to increase the vulnerability of developing psychosis (Hjern et al., 2004; Morgan et al., 2007). These early experiences may also affect the vulnerability of individuals with psychosis to stress sensitivity (Lardinois et al., 2011). Childhood abuse in particular has been found to be a

strong predictor for psychosis (Morgan et al., 2014). The vulnerability to psychosis appears to increase from the synergistic combination of adverse life events, and childhood abuse in particular appears to create an enduring vulnerability to psychosis. Lardinois and colleagues (2011) proposed that the exposure to traumatic events in childhood may sensitise individuals with a psychotic disorder to emotional and psychotic stressors and make them more vulnerable to daily life stress. This represents an acquired vulnerability due to life events that may exist alongside a genetic vulnerability.

Individuals with insecure attachment styles may experience affect regulation difficulties, which may increase stress sensitivity within the social context (Berry et al., 2007). Cognitive and affective difficulties that stem from childhood experiences and are maintained by insecure attachment styles, become evident in the interpersonal domain (Read & Gumley, 2008). Social and relational difficulties are core features of psychotic disorders such as schizophrenia (American Psychiatric Association, 2013). However, isolation, communication difficulties and impaired relationships are also predictors of psychosis (Read & Gumley, 2008). Healthy peer relationships can mitigate and help to correct distorted negative beliefs. Individuals who are isolated and socially withdrawn, lack these corrective influences. Read and Gumley (2008) hypothesised that their negative beliefs may eventually grow into psychotic beliefs.

Brown (2017) proposes several features of attachment theory that can assist in the understanding and treatment of psychosis. Her conceptualisation of psychosis as a communication of distress, includes an individual's life experiences and in particular views the development of psychosis as a psychological response to traumatic experiences. The proposed view of psychosis as an "expression of an unresolved and disorganized state of mind in relation to trauma and or loss" (Brown, 2017, p.376) provides a hopeful perspective that the development of a long-term therapeutic relationship can support an individual's process of recovery. If treated using an attachment approach, the person suffering with psychosis is offered an opportunity to develop a relationship where the focus is on understanding, exploring, and relating.

Another area of study has been the intersection of attachment in its influence on neurological development, including vulnerability to mental illness. Debbané and colleagues (2016) reviewed current perspectives of attachment adversity and its impact on the neurodevelopmental vulnerability to psychosis. They identify five neurobiological mechanisms through which insecure attachment contributes to psychosis. Their findings suggest that insecure attachment contributes to the risk of

psychosis through HPA-Axis hyperactivity, dysfunction in dopaminergic and oxytonergic systems and influence neuroinflammation and oxidative stress responses. They propose that (embodied) mentalising may constitute a protective capacity that may mitigate the neurodevelopmental vulnerability to psychosis. Orphaned children and animals who have been deprived of stable emotional attachments and touch from caregivers display altered brain development and cognitive capacities (Perry, 2002).

Attachment Literature of Individuals with Psychosis

Individuals who have experienced psychosis appear to be more likely to be categorised as insecurely attached. Three reviews of attachment studies in populations with psychosis have reported an association between insecure attachment and psychosis (Berry et al., 2007; Gumley et al., 2014; Korver-Nieberg et al., 2014). The main findings of each of these reviews will be briefly discussed.

Berry, Barrowclough & Wearden's review (2007), found an overrepresentation of insecure attachment patterns among individuals with psychosis when compared to individuals with mood disorders. Several studies in the review reported that individuals with schizophrenia described their parents as less caring and more overprotective than control groups. This parenting style, termed 'affectionless control', was associated with an earlier age of onset and higher rates of relapse in most of the studies, however some exceptions were present.

McGlashan (1987) first proposed that individuals who recover from psychosis range on a continuum and adopt one of two distinct styles; namely, a 'sealing over' or an integrative style. Individuals with a 'sealing over' style tend to view the psychotic experience as something foreign, caused by something other than personal problems. After remission, the individual continues to be aware of the negative aspects of the experience and is reluctant to investigate their experience. Those classified as using 'integration' maintain awareness that there is continuity before and after the psychotic experience; are more likely to be aware of the positive and negative aspects of the experience; view the psychosis as a source of information; are curious about the experience and elicit help from others in an attempt to understand the experience. McGlashan (1987) found lower relapse rates and improved social functioning among individuals that employed the integration recovery style. In the review by Berry and colleagues (2007), insecure attachment was associated with the 'sealing over'

recovery style. They suggested that the emotion regulation capacity that develops as a result of an individual's attachment style may serve as a potential mechanism by which to explain this association.

A systematic review of studies of adult attachment style and psychosis by Gumley and colleagues (2014) examined the relationship between adult attachment style and clinical outcomes. Attachment insecurity was associated with more negative recollections of earlier parenting experiences and greater severity of trauma. The authors suggested that early trauma and abuse contribute to the development of coping strategies that are reflective of the individual's attachment security. In recovery from psychosis, attachment strategies are hypothesised to shape symptom expression and the process of recovery. In support of this hypothesis, avoidant attachment was associated with psychiatric symptoms, as well as positive and negative symptoms of psychosis. The experiences of illness, as well as separation and loss in the context of psychosis, activate the attachment system, which leads to attempts at affect regulation that is characteristic of an individual's attachment style. Gumley and colleagues (2014) highlighted the important contribution of mental health services to provide an attuned response, a safe haven and a secure base to the individual in recovery. The review found better engagement and more treatment adherence among individuals who have secure attachment, whilst insecurely attached individuals were more likely to disengage from services. Avoidant attachment in particular was associated with difficulties in seeking help, poorer use of treatment, longer hospital admissions, and poorer therapeutic relationships. More generally, insecure attachment was associated with severity of depression, quality of life, poorer service engagement, interpersonal problems, and avoidant coping strategies.

The systematic review of attachment and psychotic phenomenology by Korver-Nieberg and colleagues (2014), found both insecure anxious and insecure avoidant attachment classifications in a population recovering from psychosis. Insecure attachment was associated with psychosis when rated with the AAI as well as with self-report measures. A study by MacBeth and colleagues (2011) that was included in the review, reported that three quarters of their sample of individuals with first-episode psychosis were classified as insecurely attached, with the majority rated as having insecure-dismissing attachment. Several studies reported modest associations between attachment avoidance and positive and negative symptoms. Both avoidant and anxious variants of insecure attachment appear to be associated with the onset of psychosis at an earlier age than individuals with secure attachment. Those with avoidant attachment had longer periods of hospitalisation than securely attached individuals. Attachment style also appears to influence the course of psychotic illness, with insecure attachment proposed to be a vulnerability factor for a more severe course of illness. The

social withdrawal and poorer quality of interpersonal relationships experienced by individuals with insecure attachment is hypothesised to be an additional source of stress influencing the course of illness. Insecure attachment and more negative remembrances of earlier parental experiences were related to 'sealing over' recovery styles. The review reported that insecure attachment was related to poorer treatment compliance, poorer use of treatment, rejection of treatment providers, less self-disclosure, and decreased engagement with mental health services (Korver-Nieberg et al., 2014).

Huguelet and colleagues (2015) identified a higher proportion of insecure avoidant attachments among individuals with psychosis measured on the AAI. Using questionnaires to assess the attachment of a community sample recovering from psychosis, Mulligan and Lavender (2010) found that insecurity in adult attachment style was associated with perceptions of parents as uncaring.

Implications for Treatment Adherence and Recovery

Individuals with insecure attachment classifications have a greater likelihood of employing maladaptive coping strategies in relation to their recovery from psychosis (Gumley et al., 2014; Korver-Nieberg et al., 2014). A review by Gumley et al. (2014) found that attachment avoidance corresponded to a lower likelihood of seeking help (r = -.55; $p < 0.01$) and poorer use of treatment (r = .32; $p < 0.05$). Individuals with first episode psychosis who had secure attachment classifications displayed significantly greater treatment adherence than those with insecure preoccupied classifications on the Service Engagement Scale's treatment adherence subscale (*M-W*: U = 3, p = 0.018) (MacBeth et al., 2011). The above findings linking attachment security to illness severity, course of illness and treatment engagement, highlight the importance of taking into account an individual's early experiences and attachments when planning treatment approaches.

The following section will provide an overview of reflective function and briefly contrast this with analogous terms used in the literature on psychosis.

Origins of Reflective Function

Human beings use an understanding of mental states – intentions, feelings, thoughts, desires, and beliefs – to make sense of and anticipate each other's actions. These understandings facilitate the ability to interpret social interactions and influence one's responses. Primate research by Premack and Woodruff (1978) examined the possibility that chimpanzees had a theory of mind, which they defined as "…the individual imputes mental states to himself and to others" (p.515). Leslie (1987) expanded the body of knowledge on theory of mind by associating this ability with a child's development of an internal representational mechanism which emerges in pretend play. He argued that the development of a theory of mind is required for a child to be able to pretend and to understand pretence in others.

Since then, there has been a burgeoning of research into the origins and role of the theory of mind in a variety of disciplines. Each school of thought emphasises a different focus area of the theory of mind and a variety of terms are used for similar mental functions, such as mentalising, metacognition and mind-mindedness (Brüne, 2005; Fonagy & Bateman, 2016). In attachment literature, the term mentalising has been favoured.

The following section will provide a brief overview of theory of mind research within the cognitive framework, specifically in relation to psychosis. Thereafter, the attachment perspective on mentalisation and the origins of reflective function will be examined. The areas of overlap and essential differences will then be highlighted. Following this, research on reflective function within populations with psychosis will be presented and, finally, the focus will shift to that of parental reflective function.

Mentalising Within the Cognitive Framework

There is a vast body of literature on mentalising, theory of mind and social cognition deficits in individuals with schizophrenia and more generally, psychosis. The construct Theory of Mind has been used synonymously with mentalising, but theoretically, and in terms of assessment methodology, it constitutes a point of departure from the use of the term within the attachment research framework. There exists both overlap and distinctions in the way that attachment theory and metacognitive theory classifies, defines, and anticipates deficits in the appreciation of internal and external mental states.

Much has been written about mentalising impairment and its association with specific symptoms of psychosis and specific diagnoses. A brief overview of these findings will be presented and the main points of departure from the attachment perspective on mentalising will be provided.

Theory of mind impairments have been associated with a variety of developmental and psychiatric conditions. Baron-Cohen (Baron-Cohen, 2001; Baron-Cohen et al., 1985) examined impairments in the ability to appreciate the mental states of others as a core impairment among children with autism spectrum conditions. Frith (1992, as cited in Frith & Corcoran, 1996) first proposed that it is an underlying cognitive misrepresentation of the intentions of oneself and others that result in positive symptoms of hallucinations and delusions.

Even within the cognitive framework, there exists multiple terms to describe similar concepts, a phenomenon which pose a difficulty for scholars and investigators to navigate the field (Schaafsma et al., 2015). In order to clarify the meanings of the current terms in use, each will be briefly defined.

Theory of Mind (ToM)

The concept of a Theory of Mind (ToM) has dominated studies focussing on mentalising difficulties in patient populations. A ToM was originally defined by Premack and Woodruff (1978) as referring to the ability to attribute mental states to oneself and others and to make predictions based on these states. The capacity for a ToM is important for social functioning, as one's knowledge about mental states is used to explain behaviour and make predictions about future behaviour (Hipolito, 2016). This ability develops during the preschool years, and its earliest manifestation is in pretend play (Leslie, 1987).

Wysok and Rybakowski (2015) have observed that there are three streams of ToM research, namely metacognition (which will be elaborated on in the subsequent section), naïve theory, which focusses on child-like mental abilities to form explanations of the mental states of others, and social cognition, referring to understanding and making inferences about the behaviour of others. Schaafsma and colleagues (2015) have pointed out that there is variation in the use of the term ToM to refer to inherently different mental processes, some examples of which include: early cognitive development, adult social cognition, an understanding of the self, a perception of others, logical inferences, and emotional or empathic responses.

ToM impairments among individuals with psychosis have a significant impact on their social and interpersonal functioning. In a meta-analysis and systematic review of functional outcomes in individuals with schizophrenia, ToM impairments were shown to be the strongest predictor for social dysfunction, greater than any other social or neurocognitive domains (Fett et al., 2011).

Metacognition

Another term utilised in clinical research on the functional and neurocognitive deficits associated with schizophrenia, is metacognition (Lysaker, Erickson, et al., 2011). The theory of metacognition proposes that metacognitive ability is associated with the development and maintenance of a variety of mental health disorders (Williams et al., 2016). Metacognition encapsulates a range of mental functions that make it possible for human beings to think about their own thoughts and feelings, those of others, and to use this information about mental states to respond to distress and social interactions (Lysaker, Dimaggio, et al., 2011). The term meta-cognition shares similarities with RF, in that it includes 'thinking about thinking' and includes self-reflectivity (Lysaker, Buck, et al., 2011). The interdependent capacities of knowledge, experiences and strategies make up metacognition (Williams et al., 2016). In a study examining poor insight in individuals with schizophrenia, better insight was associated with greater metacognitive capacity, independent of other neurocognitive impairments (Lysaker, Erickson, et al., 2011).

Dimaggio and colleagues (2011) identify three areas of difficulty associated with dysfunctional metacognition, namely (i) self-reflection, (ii) understanding the minds of others and (iii) mastery. Difficulties with self-reflection include limited awareness of emotion, compromised ability to differentiate between fantasy and reality, and problems integrating multiple and contradictory aspects of the self. Challenges related to understanding the minds of others include struggling to form an idea of the internal mental states of others, based on facial and behavioural cues and finding it difficult to appreciate that others may have different perspectives than oneself. Mastery refers to difficulties to create adaptive and effective strategies for distress tolerance and solving social problems.

Assessment of ToM from a Cognitive Perspective:

Premack and Woodruff's (1978) influential study utilised a task that assesses the ability to attribute false beliefs as a measurement for ToM. Assessment of ToM typically involve a neuropsychological test to assess an individual's capacity for ToM. Functional magnetic resonance imaging (fMRI) has been used in combination with a variety of ToM tasks to determine which neurological areas are

implicated in this ability. Areas that have been involved in reasoning about the minds of others include the left and right temporo-parietal junctions, the medial prefrontal cortex, and the posterior cingulate (Saxe & Powell, 2006). Some of the psychometric tests for ToM include false belief attribution, social animation, recognising mental states based on the area around the eyes (reading the mind in the eyes task), trait judgements and inferring mental states based on nonverbal material (rational actions) (Schaafsma et al., 2015). Research on populations with psychosis commonly use tasks that assess false belief attributions or inferences of intentions as a way of measuring the mentalising construct (Sprong et al., 2007).

Mentalising and Reflective Function (RF) within the Attachment Framework

Mentalising (or the American version, mentalization) refers to the "capacity to perceive and interpret behaviour in terms of intentional mental states, to imagine what others are thinking and feeling" (Busch, 2008, p.xv). This capacity is employed in all socio-emotional contexts to anticipate and influence one's own behaviour as well as that of others.

Recent work in the field of developmental psychology has moved beyond the focus on parenting practices as the determinant for the psychosocial adjustment of children, to focus on the parental capacity to view a child as a psychological agent (Sharp & Fonagy, 2008). The field of mentalising is heavily influenced by the investigations into the patterns by which there is concordance in attachment security between parent and offspring. Van Ijzendoorn (1995), in a meta-analysis of studies utilising the Adult Attachment Interview (AAI), confirmed the significant predictive power of the AAI to predict infant attachment security as assessed with the SSP. These findings confirmed that there is significant concordance between a parent's attachment security and that of their offspring; what is known as the intergenerational transmission of attachment. The mechanism by which attachment security is transferred from parent to child was, however, still not clear. Ainsworth's work in Uganda and Baltimore demonstrated that maternal sensitivity is important for infant attachment security. This influenced the hypothesis that maternal sensitivity was the vehicle for the intergenerational transmission of attachment. Van Ijzendoorn's (1995) analysis of studies, however, did not support this hypothesis and instead noted that mechanisms other than responsiveness accounted for the largest portion of the transmission mechanism.

These findings prompted further investigation into the representative level of attachment security. Attachment theorists have emphasised the role of a child's early social relationships as the context within which the ability to mentalise develops (Fonagy & Target, 1997). Main (1991) suggested that a child's early experiences within their caregiving context not only affects the child's attachment with their caregivers, but also the child's metacognitive capacity which is utilised to monitor attachment experiences.

Work by Main, Kaplan and Cassidy (1985) aimed to extend the understanding of individual differences in attachment from a behavioural to a representational level. They proposed that differences in attachment security are grounded in the mental representations of the self in relation to others. This constituted a departure from the previously dominant approach of assessing attachment by observation of interaction or general functioning. Main and colleagues (1985) highlighted the nature of organised internal working models as including "…feelings and behaviour but also attention, memory, and cognition, insofar as these relate directly to attachment" (p. 67). Their work paved the way for attachment researchers to employ a narrative approach to examine constructs related to attachment security (Adult Attachment Interview) and RF (Parent Development Interview).

Mentalising is proposed to be the mechanism by which the mother-child relationship determines the child's attachment security as well as how this relationship shapes the child's socio-cognitive development (Sharp & Fonagy, 2008). Where Main's focus was on the cognitive appraisal processes in developing a meta-cognition (mind-mindedness), Fonagy and colleagues (Fonagy, Steele, Steele, et al., 1991) utilised psychoanalytic concepts of affect regulation and intersubjectivity to expand the concept of mentalisation beyond cognitive intentionality. This shift placed the focus on the interpersonal and intersubjective mechanisms that are inherent in "thinking about one's own and others' internal, mental and explicitly affective experience" (Slade et al., 2005, p. 286). In line with this, Fonagy and colleagues (2007) proposed the inclusion of a representational processing system that encompasses the process of inferring mind states to oneself and others to predict behaviour.

Attachment relationships are instrumental in the regulation of intense and often negative affect. Secure attachment relationships support the infant's neurodevelopment of brain structures specifically aimed at developing this perspective-taking, mentalising function (Schore, 2001). Fonagy and colleagues (Fonagy, Steele, Steele, et al., 1991; Fonagy & Target, 1997) proposed that the examination of the transmission of attachment security should include consideration of one's capacity

to think about emotions and the relation thereof to behaviour, which was termed "reflective function". In order to test this hypothesis, Fonagy and colleagues (Fonagy, Steele, Steele, et al., 1991) developed the "Reflective Self-Function Scale" as a means to assess the capacity to recognise and reflect on one's internal mental experience, to construct representations of this internal world, and to be aware of the implications of these mental states in interpersonal contexts. Initially, this scale was designed to be used with the AAI to identify the capacity to understand mental states in recollections of childhood experiences with attachment figures. Fonagy and colleagues (Fonagy, Steele, & Steele, 1991) demonstrated that prenatal maternal attachment representations as measured with the Adult Attachment Interview predicted the attachment security of their infants at one year of age. Fonagy and Target (2005) suggested that the mother's mentalising capacity makes it possible for her to create a psychological and physical environment that allows for her to become a secure base for her infant. This scale has since been revised and is currently in its fifth iteration (Fonagy et al., 1998).

Two complementary theories inform the theory of how mentalising develops – the social biofeedback theory and the theory of psychic reality. The social biofeedback theory described by Gergely and Watson (1996) proposes a complex biosocial system in which infants communicate changes in their affect through behavioural signals, which prompts the mother to respond with marked mirroring. The marked aspect of mirroring conveys to the infant that the mother's response is not indicative of her own internal affective state. This type of mirroring is hypothesised to serve three functions: (i) to facilitate the infant's affect regulation, (ii) contribute to the infant internalising the mother's secondary representation of the infant's primary affective state, which becomes incorporated into the infant's representation of themselves, and (iii) become a way of communicating within the dyad. The theory of psychic reality proposes that a child must transition from three split modes of experiencing the world towards an integrated world of mentalising (Fonagy, 2006). Psychic equivalence refers to the experience of very young children where the internal world is equated to the external reality. During this stage of life, children are not yet able to distinguish mental experiences from physical experiences and their perception of the world does not yet include an understanding of mental representations. Pretend mode refers to the following stage during which a child is able to differentiate between internal and external reality, but is convinced that the one has no influence on the other. The two facets of reality must be kept strictly apart, such as in play. In the teleological mode, the world is experienced as if mental representations are only present when expressed in an action. These modes of thinking become integrated into a mentalising capacity in normal development when a child starts to comprehend that thoughts and feelings are mental representations that can be expressed in

behaviour. The capacity to mentalise is considered a developmental achievement that depends on the quality of caregiving received by the child (Katznelson, 2014).

A recent meta-analysis by Zeegers and colleagues (2017) found that parental mentalisation fosters secure attachment and facilitates parental sensitivity. Their findings indicate that parental mentalisation directly influences their infant's attachment security, independent of the parent's sensitivity. Indirectly, the parent's ability to be aware of and attuned to their infant's mental states also influenced the parent's sensitivity, which had an indirect effect on attachment security. The authors (Zeegers et al., 2017) found that although the act of mentalising increased the parent's awareness of their infant's mental states, it may not automatically translate to an ability to transform this ability into sensitive behaviour.

Reflective Function (RF) refers to the overt, measurable manifestation of an individual's capacity to mentalise within an attachment context (Fonagy & Target, 2005). The focus of this manuscript will be on the concept of RF, defined as "the capacity to understand and interpret – implicitly and explicitly – one's own and others' behaviour as an expression of mental states such as feelings, thoughts, fantasies, beliefs and desires" (Katznelson, 2014, p. 108). It is understood as the operationalisation of the mental processes that underlie mentalising (Fonagy & Target, 2005). RF facilitates the understanding of the motivations behind the behaviour of oneself and others and in doing so, provides meaning and predictability to that behaviour (Fonagy & Target, 1997). RF has been implicated as the possible mechanism by which the intergenerational transmission of attachment classification from a parent to their offspring, occurs (Slade et al., 2005).

Badoud and colleagues (2015) have identified three areas of study about RF. Initially, RF was utilised as a way to correlate Parental RF (PRF) with child outcomes. These studies provided evidence for the potential mechanism by which the intergenerational transmission of attachment occurs – the phenomenon that a parent and child have similar attachment classifications (Fonagy & Target, 2005). The second direction of study examined differences in adult RF among clinical populations. Patterns of disrupted RF have been implicated in a range of psychiatric conditions, among others borderline personality disorder, substance abuse (Suchman et al., 2010), psychosis (MacBeth et al., 2011), eating disorders (Pedersen et al., 2012), and depression (Fonagy et al., 1996). The third wave of studies are aimed at investigating the role of RF in psychotherapeutic processes and outcomes. The present study

is situated within the second avenue of RF research, with a focus on PRF in the clinical population of mothers who have experienced peripartum psychosis.

The following section will briefly explore the measures developed to assess RF within the attachment framework.

Assessment of RF

Fonagy and colleagues (Fonagy, Steele, Steele, et al., 1991) first employed the Reflective Self-Function Scale, a coding system for use with the AAI to assess a parent's appreciation of the intentionality of others in their classical study, the "London Parent-Child Project" (AAI-RF). RF was coded from the adult's reflections of their childhood relationships with their parents in mental state terms. RF as coded on the AAI was shown to correlate with adult and infant attachment security (Fonagy, Steele, Steele, et al., 1991). Since then, several measures have been developed to assess RF in adult and child populations.

In a systematic review of all assessment measures of child-focused maternal mentalisation, fifteen measurement instruments were identified (Schiborr et al., 2013). Instruments were categorised into interview and observational instruments. Since its first use with the AAI, the Reflective Function Scale has been adapted to be used with the Parent Development Interview (PDI), the Pregnancy Interview (PI) and the Working Model of the Child Interview (WMCI).

Slade and colleagues (2014) developed the Revised Parent Development Interview (PDI-RF) as a direct means of measuring a parent's mental representations in relation to their role as parent and that of their child. This interview is based on the PDI by Aber and colleagues (Aber et al., 1985). The coding manual for the PDI (Slade et al., 2005) was developed from the Reflective Functioning Scoring Manual (Fonagy et al., 1998) and is used as an adjunct to the Reflective Functioning Scoring Manual. Four indices of RF are coded within the backdrop of child development. These are: (i) an awareness of the nature of mental states, (ii) the explicit effort to tease out mental states underlying behaviour, (iii) recognizing developmental aspects of mental states and (iv) mental states in relation to the interviewer. The PDI-RF is the measurement employed in the present study and will be described in more detail in the Methods section of this manuscript.

Since the review by Schiborr and colleagues (2013), several questionnaires have been developed to assess RF and PRF. These include the Reflective Functioning Questionnaire (RFQ; Fonagy et al., 2016), the Parental Reflective Functioning Questionnaire (PRFQ; Luyten et al., 2017) and the Prenatal Parental Reflective Functioning Questionnaire (P-PRFQ; Pajulo et al., 2015).

Contrasting Attachment and Cognitive Perspectives

Differences between the attachment and cognitive approaches to mentalising include divergences with regard to the theoretical basis of mentalising, hypotheses regarding the development of the capacity and assessment techniques.

The cognitive understanding of psychosis favour the individual's appraisals and interpretations of events as explanations for the development and maintenance of psychotic phenomena (MacBeth et al., 2011). In emphasising neurocognition, this perspective neglects the role of mentalising in regulating affect in interpersonal contexts (Braehler & Schwannauer, 2012). In contrast, the attachment framework of understanding psychosis emphasises the developmental and interpersonal contexts of experiences as critical to understanding the development of emotion regulation strategies and interpersonal skills (Fonagy & Target, 1997).

Both approaches emphasise the importance of experiences in early relationships for developing the skills associated with a capacity for mentalising. They also share the conviction that early experiences facilitate the establishment of a cognitive frame (an internal working model or a cognitive schema). Each of the approaches have studied deficits in mentalising. Where the cognitive model takes a more medical approach to study the neurological pathways and cognitive structures associated with mentalising, the attachment framework has a greater focus on the relational and interpersonal contexts. From this point of departure, the attachment framework was considered to be the favoured approach utilised for the investigation of PRF in this study.

RF in Psychosis

RF has been studied in various clinical populations, but for the purposes of this manuscript, the current literature of RF in populations with psychosis will be reviewed. To date, there have only been two studies specifically assessing RF in populations with psychosis, both of which are in the field of

first episode psychosis. Therefore, studies of related concepts within the attachment framework, such as mentalising, will also be included.

In the first study to examine RF as measured on the Adult Attachment Interview (AAI) in psychosis, MacBeth, Gumley, Schwannauer and Fisher (2011) found a low level of RF among individuals with first episodes of psychosis. RF scores ranged from absent (RF = 1) to explicit (RF = 7), with a median of low RF (RF = 3), the latter was consistent with scores reported from other clinical samples. RF scores were significantly lower for individuals classified to have insecure dismissive attachment when compared to both securely attached and insecure preoccupied classifications. Surprisingly, reflective capacity was not associated with positive or negative psychotic symptoms or general psychopathology, suggesting that attachment and RF may not be compromised by psychotic symptoms and that RF may be a trans-diagnostic concept.

A subsequent study by Braehler and Schwannauer (2012) examined the RF in adolescents recovering from a first episode of psychosis using the AAI and an open-ended interview focused on adaptation. Similar rates of RF were found when comparing RF on the AAI and the adaptation interview. Almost two thirds of the young people displayed impaired RF in their attachment interview and the adaptation narrative. Individuals who displayed moderate RF appeared to have a positive adaptation process after experiencing psychosis. Those with impaired RF were more likely to have experienced unsuccessful adaptation and were shown to ruminate over losses or denied the emotional impact of the psychosis. There appeared to be an association between the participants' ability to mentalise about their early attachment relationships and their recovery from psychosis, pointing to the possibility that the way in which these adolescents reflect on their experience of psychosis is indicative of their general reflective capacity. Although the sample size was small, the authors suggest that recovery interventions should incorporate efforts to assist patients recovering from psychosis in a mentalisation-based intervention (Braehler & Schwannauer, 2012).

A meta-analysis of studies examining mentalisation in schizophrenia, found significant and stable impairment in mentalising ability across all symptom subgroups (Sprong et al., 2007). Mentalisation impairment was not moderated by variables such as IQ, gender or age and similar impairments were noted for verbal and non-verbal tasks. The impairment in mentalisation was greatest for individuals who displayed disorganised symptoms and there was a negative correlation between mentalising and quality of life. Deficits in mentalising were present in participants who were in remission, suggesting

that the impairment is not solely a consequence of the acute phase of the illness, but may be trait-dependent.

Mentalising impairments may lead to misunderstanding the intentions of others, interpersonal difficulties and poorer treatment engagement (Korver-Nieberg et al., 2014). Berry and colleagues (2007) reported that both insecure attachment and mentalising impairments have been found in individuals with paranoid symptoms. Salvatore et al. (2008) suggest that deficits in mentalising in social interactions increases emotional arousal, which may lead to social withdrawal. Several authors have suggested that mentalising may be a key mediator between attachment and psychosis (Korver-Nieberg et al., 2014; MacBeth et al., 2011; Read & Gumley, 2008).

From clinical examples, Debanné and colleagues (2016) suggest three potential impairments in mentalising that may occur in individuals with psychosis. Individuals with psychosis could construct rigid beliefs about the intentions of others, which are solely based on the other's observable behaviour, without considering potential alternative explanations. This is known as teleological mentalising (Luyten et al., 2019), and could give rise to delusional beliefs. Secondly, the authors suggest that beliefs are viewed as isomorphic to reality, a phenomenon known as psychic equivalence (Debbané et al., 2016). In this example, an individual's belief about someone else's intentions is regarded as factual and the potential for considering the opacity of another's mind is disregarded. Lastly, an individual may engage in hyper-reflexivity, characterised by mentalising that is disconnected from the affective, sensory, or perceptual context. This type of discourse may appear highly complex, but upon further enquiry, the content remains superficial and this is known as pretend mode mentalising (Debbané et al., 2016). Although these three examples are not specifically in relation to PRF, these types of mentalising impairments may be present in some of the mothers in the present sample.

In keeping with this suggestion, Brent and colleagues (2014) have proposed a model whereby individuals who are predisposed to psychosis may be at an increased risk for developing psychotic symptoms by virtue of the impact of mentalizing impairments and attachment disturbances. Figure 1 outlines the hypothesised pathways by which attachment disturbances impact the areas of mentalising, chronic stress and reduced oxytocin/mesolimbic dopamine inhibition. This model proposes that in individuals with a genetic predisposition to psychosis, disrupted attachments may lead to (1) an impaired understanding of self and others (impaired mentalising) and (2) dopamine dysregulation and states of hyperawareness that stem from chronic stress / HPA-axis dysfunction in

combination with reduced oxytocin/mesolimbic dopamine inhibition. These areas of dysfunction lead to heightened states of awareness, which may lead to (and be affected by) abnormal explanations for social experiences. All these factors may contribute to a psychological vulnerability for the emergence of psychotic symptoms.

Figure 1. Model of Impairments in Mentalisation Associated with Early Caregiving Environment and Psychosis (Brent et al., 2014)
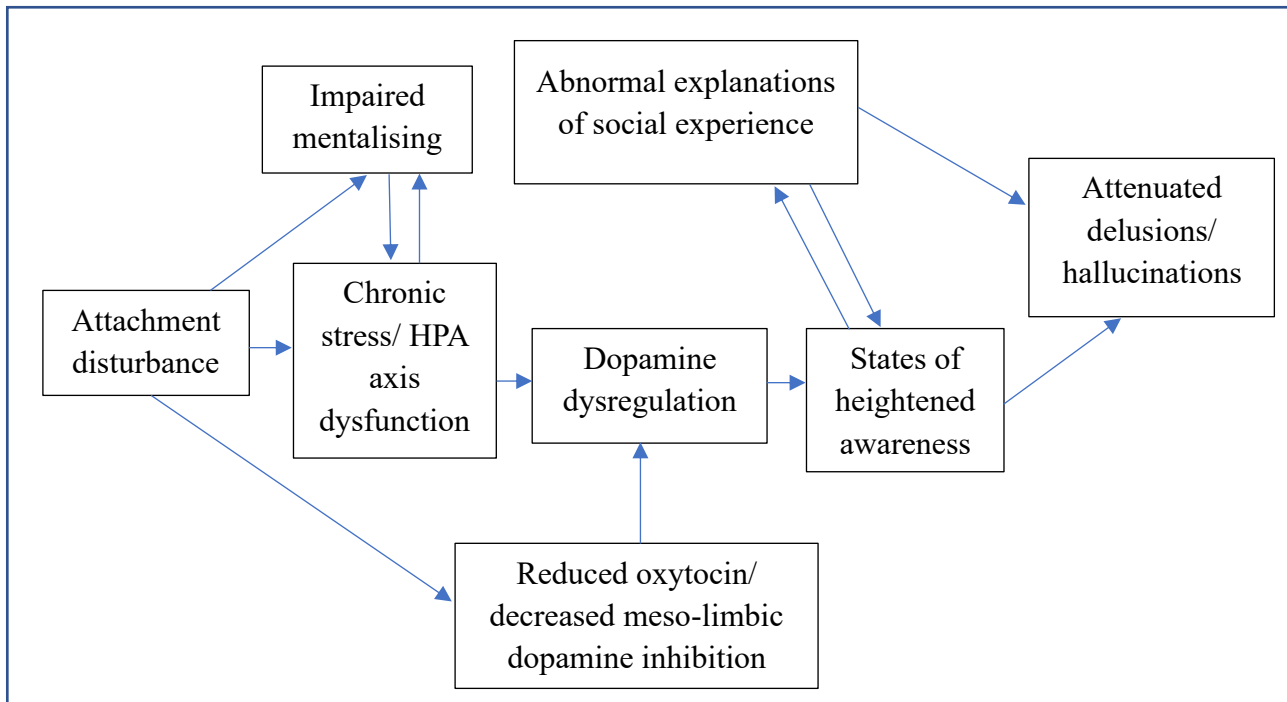
This section provided an overview of reflective function (RF) and summarised the cognitive and attachment perspectives related to the development and assessment of RF. The following section will focus on the construct of parental reflective function (PRF) and its importance within the parent-child relationship.

Parental Reflective Functioning (PRF)

Slade et al. (2005) define PRF as the "the parent's capacity to reflect upon her own and her child's internal mental experience" (p. 269). She proposes that it is this capacity to understand the "nature and function of her own as well as her child's mental states that allows her to create both a physical and psychological experience of comfort and safety for her child" (Slade, 2005, p. 284). This capacity to make sense of her child's internal states becomes especially important in the early phases of parenting when the infant relies on the parent to understand their communication bids when language has not yet developed. Interactions between infants and caregivers are characterised by intense emotion and dependency, conditions under which the parent is challenged to maintain an accurate understanding of themselves and their infants, more so than when the child is older (Ensink et al., 2019).

Parental mentalisation is thought to facilitate a secure attachment relationship. When a parent is able to take into account the thoughts and feelings of their infant in understanding their behaviour, it communicates to the infant that their affective states are being recognised (Fonagy & Target, 1997). This reciprocal process indicates to the infant that the parent is mirroring the infant's affect. When the infant's subjective experiences are adequately mirrored by an attachment figure, the infant's affect may be contained. By containing and validating the infant's distress, the caregiver communicates the separateness of mother and infant mental states. Through this relationship, the groundwork is laid for the infant to develop the ability to regulate their affect and to develop mentalising and self-control, which includes that of attention and effortful control (Luyten, Mayes, et al., 2017). It is hypothesised that neither secure attachment, nor emotional availability on their own foster infant secure attachment, but rather a social context which focusses on mental states (Fonagy et al., 2007).

PRF is considered to be a relationship-specific manifestation of the more general mentalising capacity of RF (Luyten, Mayes, et al., 2017). In the first study to examine PRF (as measured with the PDI) and attachment outcomes, maternal RF was significantly associated with the mother's attachment classification as well as to infant attachment (Slade et al., 2005). Adult attachment was measured with the AAI in a sample of 40 mothers during pregnancy. PRF and infant attachment were assessed at 10 and 14 months, respectively. Mothers who were rated as secure (autonomous) in their attachment had significantly higher scores for RF than mothers in the insecure (dismissing and preoccupied) categories. Those in the insecure categories had higher levels of PRF than mothers rated as unresolved (disorganised). The authors noted that there was variation in the reflective capacity of even the most

reflective mothers, confirming that the parent-child relationship is filled with emotionally charged interactions that may interfere with reflective capacity (Slade et al., 2005). RF was also associated with infant attachment status, with high RF shown to be correlated with secure infant attachment and lower RF correlated to insecure attachment status in the infants. Mothers of infants categorised as resistant and disorganised had the lowest levels of RF. These results confirmed the hypothesis by Fonagy and colleagues (Fonagy, Steele, Steele, et al., 1991) that a mother's capacity to make sense of her child's behaviour through an understanding of their internal experience, is linked to the infant's experience of safety within that relationship. Further, the results provided support for the hypothesis that PRF could be considered as the central mechanism for the intergenerational transmission of attachment (Slade et al., 2005).

There is the presence of a 'loose coupling' between PRF, parental secure attachment and parental emotional availability (Fonagy et al., 2007; Luyten, Nijssens, et al., 2017). Parents who are rated as secure in their attachments are likely to have greater capacity for RF and for providing attuned and sensitive responses to their offspring. The two concepts of RF and PRF are related, but their association is not completely matched. Steele and colleagues (Steele, Kaniuk, Hodges, Asquith, Hillman, Steele, 2008, as cited in Luyten et al., 2017) reported a correlation of $r = .50$ between general RF and PRF.

Work by researchers at the Yale Child Study Centre in the field of mentalisation-based parenting interventions for substance abusing women, found that there are two related, but distinct dimensions of PRF; namely, self-focused and child-focused dimensions (Suchman et al., 2010). Of these two dimensions, only self-focused RF was found to strongly predict caregiving sensitivity. Follow-up studies found that self-focused RF improved with intervention, lending further weight to the idea that mentalising has an affect-regulation function, particularly in this population that commonly use substances to regulate affect (Suchman et al., 2012).

A concept similar to parental mentalisation is mind-mindedness. Mind-mindedness can be defined as a caregiver's tendency to consider their young child as having a mind of their own (Meins et al., 2013). The capacity for mind-mindedness has been operationalised in three ways: (i) the caregiver's propensity to describe their pre-schooler in mental state terms, (ii) to attribute meaning to the non-word verbalisations of infants, and (iii) to comment accurately to their infant's assumed mental states during play interactions. Although these terms refer to similar mental capacities, Meins and

colleagues (2014) argue that mind-mindedness is distinct from mentalising. The authors contend that mind-mindedness encompasses an individual's tendency to use mental state terms to describe close relationships, rather than a more basic cognitive function of awareness of mental states. Maternal mind-mindedness may be assessed using an observational or a narrative procedure. Mind-mindedness online is a coding scheme to assess a parent's awareness of a child's mental states while interacting. Videos are recorded, transcribed and verbal comments are coded (Schiborr et al., 2013). An interview format is used to code a parent's descriptions of her child into mental, behavioural, physical, or general terms to assess the use of affective and cognitive representations of the child. In a study to examine the association between mind-mindedness and adult mentalising on a theory of mind task, Barreto and colleagues (2016) found their association to be non-significant, confirming that the two terms refer to distinct constructs.

Luyten and colleagues (Luyten, Nijssens, et al., 2017) propose that disruptions to PRF may present in one of two ways. Either in the form of too little or deficient RF (demonstrated as limited or concrete expressions), or excessive RF (expressed by assumptions on the part of the parent that go beyond what is probable) (Luyten, Nijssens, et al., 2017). The presence of emotional arousal in parents appear to negatively impact their parental reflective capacity.

Becoming a parent can be considered a developmental challenge, and the increased stress of this transition may exacerbate an existing mental illness (Keren & Tyano, 2015). Mental illness may also impinge on the early parent-infant relationship through maladaptive parenting and in this way, affect the infant's development (Suchman et al., 2016). While the presence of a mental illness may affect parental reflective capacity, Muzik and colleagues (2015) proposed that when psychiatric symptoms are adequately controlled, the parent has an increased capacity to self-reflect, and to attend to the emotions and needs of their child.

PRF in Populations with Psychosis

To date and to the best of our knowledge, there has not been published studies utilising the PDI or Reflective Functioning Scale in populations with peripartum psychosis.

The mentalising impairments of individuals with psychotic illnesses, when applied to the parenting context, may point to areas of vulnerability within the present sample. A mother develops the

attachment relationship with her infant through ongoing and repetitive care and interaction with her infant. During this evolving process, the infant's temperament, preferences and ways of communicating their needs become known to the parent and through ongoing interaction between mother and infant, the parent is able to form an understanding of the infant's needs and internal affective states.

Ongoing interaction with the infant as well as the capacity for mentalising is required for the development of PRF. It is hypothesised that mothers who have experienced peripartum psychosis may be at a disadvantage in this process due to several factors. Firstly, due to the nature of psychotic symptoms, the ability of these mothers to reflect accurately on their own mental states as well as that of others is compromised for the period that they experience psychotic symptoms. Secondly, the experience of psychiatric symptoms may necessitate admission to a psychiatric facility for treatment. The women in this study who required postpartum admissions were all admitted to an acute adult psychiatric facility that does not have the capacity for joint mother and baby admissions. This has the implication that there are separations between mothers and their infants during the early postpartum period, which is a sensitive period for development of attachment and understanding of infant cues. Thirdly, the sedating impact of psychotropic medications may impact the ability of the mothers to pick up on their infants' bids and cues. For these reasons, it is anticipated that mothers who have had psychotic symptoms during the peripartum period would have lower than 'adequate' scores for PRF in relation to their infants.

PRF and Maternal Caregiving Behaviour

Although RF has been implicated as the mechanism by which the intergenerational transmission of attachment takes place, the exact mechanism by which this occurs was still in question. Grienenberger and colleagues (2005) first used the PDI to explore the links between PRF and maternal caregiving behaviour. Mothers with a low PRF were found to have significantly disrupted affective communication as measured by the Atypical Maternal Behaviour Instrument for Assessment and Classification (AMBIANCE). Disrupted affective communication as assessed by the AMBIANCE provides an indication of the mother's ability to regulate her child's negative affect or distress. Negative maternal caregiving behaviour was inversely correlated to maternal RF. The authors found that PRF's role in the intergenerational transmission of attachment is mediated through the mother's behaviour, in particular her ability to provide regulation for her infant's distress and fear (Grienenberger et al., 2005).

Several studies have since confirmed the association between PRF and maternal sensitivity (Camoirano, 2017). In a prospective study of 88 mother-infant pairs, prenatal maternal RF about attachment predicted their caregiving sensitivity and negative behaviour of intrusiveness and withdrawal (Ensink et al., 2016). The association between maternal RF and infant attachment was mediated by maternal negative behaviour. This led the authors to suggest that mothers who had greater reflective capacity were able to inhibit their own negative, intrusive, aggressive, and withdrawn responses, which would have undermined the development of secure attachment (Ensink et al., 2016). By protecting their infants from negative behaviours, mothers who were aware of their own negative affects could imagine their infants' experience and limit their exposure to such distressing affects. Investigating the long-term consequences of parental RF, Ensink and colleagues (2019) demonstrated that both prenatal and postnatal RF had a negative correlation with maternal insensitivity. Their study also showed that maternal RF rated at six months post-partum were predictive of infant attachment security at 16 months, indicating that maternal reflective capacity during infancy has long-term implications for attachment organisation. The studies by Ensink and colleagues (2016, 2019) replicated the earlier work by Fonagy et al. (Fonagy, Steele, & Steele, 1991), demonstrating that mentalising, which develops in the context of earlier relationships with parents, has a lasting influence on parental caregiving (Camoirano, 2017).

Mothers' reflective capacity has also been shown to influence caregiving sensitivity in clinical and at-risk populations. A study of mothers with substance-use disorders indicated that low levels of maternal RF were associated with insensitive and emotionally unresponsive maternal behaviours, such as withdrawal, hostility and intrusiveness (Suchman et al., 2010). Improved RF, especially self-focused RF, of substance-using mothers who attended a mentalising-based intervention led to improvements in the quality of maternal caregiving (Suchman et al., 2011, 2012). In a similar high-risk sample of substance-using mothers, the level of maternal RF was significantly and positively correlated with maternal sensitivity (Alvarez-Monjaras et al., 2019).

In a relatively large sample of women with demographic risk factors, there were significant associations between maternal RF and higher parenting sensitivity and lower parenting negativity (Stacks et al., 2014). Maternal RF also significantly predicted infant attachment security, with mothers whose infants were classified as securely attached attaining higher RF than those of infants classified as avoidant or disorganised. Extending the work by Grienenberger et al., (2005), Stacks et al. (2014) found that parenting sensitivity mediated the association between RF and infant attachment security and, similarly, that parenting negativity mediated the relationship between RF and infant attachment

insecurity. Contrary to the authors' expectations, RF was not significantly associated with experiences of childhood abuse or PTSD symptoms (Stacks et al., 2014).

In a sample of mothers who suffered from interpersonal violence-related Post-traumatic Stress Disorder (PTSD), there was a significant positive correlation between maternal RF and caregiving sensitivity (Suardi et al., 2020). In their study, lower RF and a greater severity of PTSD symptoms were predictive of less sensitive maternal interactions. Further, mothers who suffered interpersonal violence at the hands of their infants' fathers had significantly lower PRF scores (Suardi et al., 2020).

Maternal Caregiving in the Context of Psychosis

Caregiving behaviour, as well as child temperament, influences the development of attachment. Attachment security is related to the primary caregiver's ability to sensitively care for her infant, create security, soothe distress and be accurate in response to child cues (Belsky & Fearon, 2008). Factors that may contribute to parenting difficulties in individuals with psychosis include the nature and duration of illness symptoms, medication, and side-effects. The following section will examine studies of attachment in mothers with psychiatric disorders and then examine the literature focused on mother-infant interaction of mothers with psychosis.

Attachment Relationships in Context of Parental Psychopathology

Maternal psychiatric illness may have a significant impact on the quality of attachment with their infants. Both the presence of maternal psychiatric symptoms and hospitalisation for treatment during a relapse may have adverse effects on the quality of the mother-infant relationship. In psychotic illnesses such as schizophrenia, positive and negative symptoms may adversely affect the interaction between a mother and her infant (Snellen et al., 1999). However, much of the research on maternal psychopathology and its influence on parenting and infant attachment has focussed on mothers with depression. Children may be developmentally vulnerable due to the effect of maternal psychopathology on attachment (Wan, Abel, et al., 2008; Wan & Green, 2009). Although maternal sensitivity plays an important role in the development of infant attachment, other significant aspects of maternal behaviour include the breakdown of affective communication and intrusion of behaviours that signal unintegrated fear, hostility and anxiety (Grienenberger et al., 2005). The quality of mother-infant interaction in the early postpartum period appears to be particularly important, as

improvements in the quality of dyadic interaction may not lead to improvements in child cognitive or emotional outcome when these improvements occur after 6 months postpartum (Hipwell et al., 2000).

D'Angelo (1986) reported that infants of mothers with schizophrenia were significantly more likely to be categorised as insecure-avoidant when compared to infants of healthy or depressed mothers. Hipwell and colleagues (2000) found that mothers with a postpartum manic episode were more likely to have secure attachment with their infants and mothers with depression (psychotic or nonpsychotic) were more likely to have an insecure attachment. Disturbances in the quality of interaction were present at 1 year postpartum in the sample of women with psychiatric disorders indicating potential long-lasting effects that maternal psychiatric symptoms may have on interaction (Hipwell et al., 2000).

A small comparative study by Steadman and colleagues (2007) investigated the combined effect of severe mental illness (SMI) and related deficits in cognitive function on mother-infant interaction. Compared with mothers without a psychiatric history, mothers with SMI displayed significantly lower levels of sensitivity in their play interactions and they rated themselves significantly lower on parental competence. Infants of mothers with SMI were rated as significantly less cooperative than those in the healthy control group. On cognitive tasks, only speed of memory processing differentiated the clinical from the control group. A hierarchical multiple-regression analysis indicated that cognitive impairment mediated the relationship between SMI and reduced maternal sensitivity, suggesting that impairments in mother-infant interaction of mothers with SMI may be partially due to cognitive deficits associated with their psychiatric illness (Steadman et al., 2007).

A review by Wan and Green (2009) found that not all children of mothers with mental health difficulties develop lasting impairment in attachment. However, children were more vulnerable to developing insecure or disorganised attachment when maternal psychopathology was severe and prolonged, and when other risk factors such as parent trauma were present. In a small Finnish sample, the presence of parental psychopathology was associated with and predicted emotional and behavioural problems in children at two years of age (Mäntymaa, et al., 2004).

Mother-infant Interaction of Mothers with Psychosis

Snellen and colleagues (1999) examined the association between positive and negative symptoms of mothers who were hospitalised postpartum with a diagnosis of schizophrenia. Upon discharge, mothers displayed significantly fewer positive symptoms as measured on the PANSS, but there was minimal change in their level of negative symptoms. Their study confirmed an expected correlation between the severity of symptoms and the quality of mother-infant interactions (Snellen et al., 1999). Mothers with more severe positive symptoms displayed poorer quality of interactions with their infants, characterised by maternal unavailability in the form of unresponsiveness, understimulation, inattention, limited expression of positive affect and were more likely to display hostility and disorganised parenting. Upon discharge, mothers with more prominent negative symptoms had poorer quality of interaction with their infants, which were characterised by maternal inattention, unresponsiveness, understimulation and disorganisation (Snellen et al., 1999). In cases where there were persistent positive symptoms, mothers were more likely to display ongoing hostility. Infant factors did not appear to correlate to the severity of maternal psychopathology, which led Snellen and colleagues (1999) to consider a possible delayed effect on infant mental health, which they did not specifically assess. Improvements in the psychotic symptoms of mothers were associated with improvement in the quality of mother-infant interaction. The authors emphasised that infants of this group of mothers remain at risk for suboptimal interactions and that ongoing intervention post-discharge remains important (Snellen et al., 1999).

A study by Riordan, Appleby and Faragher (1999) highlighted significant differences in the quality of postpartum mother-infant interaction of women with schizophrenia when compared to women with affective disorders. Mothers with schizophrenia displayed greater remoteness, insensitivity, intrusiveness, and self-absorption than those with affective illnesses. The behaviours of the infants of mothers with schizophrenia were also rated as more avoidant than the infants of mothers with affective disorders. Similar to the current study, the sample size reported by Riordan et al. (1999) was relatively small. Although different measures were used to assess the quality of mother-infant interaction; both assess variables related to maternal and infant behaviour and both assess the dyad's interaction.

Wan and colleagues (2007) replicated earlier findings that mothers with schizophrenia have poorer quality of interaction with their infants when compared to mothers with affective disorders. Mothers with schizophrenia were less warm and less accepting of their infants than mothers with affective

disorders. Maternal remoteness and intrusiveness were consistently associated with the group of mothers with schizophrenia. The authors associated this combination of behaviours with unpredictable interaction, which has the potential to be harmful to the formation of secure attachment (Wan et al., 2007). Compared to infants of mothers with affective disorders, the infants of mothers with schizophrenia displayed more avoidance, were less communicative, were less engaged with the environment and were less lively. Contrary to findings from Snellen et al. (1999), factors related to illness severity or poor social circumstances could not account for the poorer quality of interaction among mothers with schizophrenia. Infant avoidance of the mother was associated with deficits in maternal sensitivity and responsiveness. Limitations in the quality of parenting were highlighted as in particular need of intervention (Wan et al., 2007).

Wan and colleagues (Wan, Warren, et al., 2008) extended these findings by comparing the mother-infant interaction patterns of mothers with schizophrenia to those with affective disorders (combined group of unipolar depression and bipolar disorder) while admitted to a mother baby unit, and investigated the nature and quality of maternal responsiveness. Despite similar rates of responsiveness as mothers with affective disorders in brief play interactions, mothers with schizophrenia displayed significantly lower rates of positive responsiveness. Mothers with affective disorders displayed three times more positive responses than negative responses, while mothers with schizophrenia had similar rates of positive and negative responses. Both groups displayed non-responsiveness, but tended to differ according to the reasons for the behaviour. Mothers with schizophrenia tended to lack responsiveness to infant behaviours due to being psychologically withdrawn, while non-responsiveness by mothers with affective disorders was due to being visually distracted by their infant's behaviour (Wan, Warren, et al., 2008). Similarly, groups differed according to the display of negative responses. Whereas mothers with affective disorders responded negatively to negative infant behaviours, mothers with schizophrenia displayed three unique types of negative responses which were largely lacking in the affective group. These included negative responses to positive behaviour, psychologically withdrawn non-responsiveness and abnormal behaviour. The authors likened incongruent maternal negative responses to infant positive and neutral behaviour in the schizophrenia group to unpredictable and potentially frightening responses, and hypothesised that these response patterns may be caused by social cognitive deficits or residual positive symptoms (Wan, Warren, et al., 2008).

Examining the content and style of speech aspect of the mother-infant interaction, Wan and colleagues (Wan, Penketh, et al., 2008) found that mothers with schizophrenia did not differ in relation to the

structure and style of speech to their infants compared to mothers with other clinical diagnoses. However, mothers with schizophrenia exhibited significantly less infant-directed speech and an absence of songs or rhymes. Infant-directed speech, or motherese is an important component of infant affect regulation and promotes cognitive development and language acquisition (Dave et al., 2018; Lacroix et al., 2002). Lower rates of infant-directed speech were associated with older maternal age and diagnosis of schizophrenia, possibly indicating the impact of a longer duration of illness. The lack of infant-focussed content in the speech of mothers with schizophrenia was considered possibly reflective of a limited understanding of the internal experiences of their infants.

Contrary to the previously cited studies, Pawlby and colleagues (2010) found that mothers with severe mental illness did not differ significantly from healthy controls in terms of mind-mindedness when interacting with their young infants. According to their findings, the presence of severe mental illness does not guarantee that the mother will misinterpret her infant's mental states. Their study compared healthy controls to mothers with schizophrenia, depression and mania who were treated at a mother-and-baby unit (MBU) and were assessed at admission and discharge. The schizophrenia group showed significant gains at discharge in terms of talking to their infants. Mothers with mania were significantly more likely to touch their infants when compared to the schizophrenia group. Inconsistent with previous findings, the mother-infant interaction of mothers with schizophrenia on discharge corresponded most with that of the healthy controls. Mothers with mania and depression displayed more intrusiveness than mothers in the control group. A limitation to this study was the fact that mothers who were separated from their infants at discharge were not included in the study results (Pawlby et al., 2010).

Rigby and colleagues (2016) examined the association between maternal sensitivity and ToM in a group of women with severe mental illness. Maternal sensitivity was significantly related to the mothers' diagnosis, with mothers diagnosed with schizophrenia obtaining the lowest score. Only one of the ToM tasks, a computerised non-verbal animation sequence where mothers were required to attribute the intentions of silent animated figures, was related to maternal sensitivity for all diagnostic groups. Higher social cognitive functioning was related to increased sensitivity. An unexpected finding was that ToM was not related to diagnosis and that ToM impairment did not mediate the relationship between diagnosis and sensitivity (Rigby et al., 2016).

Kenny et al. (2013) compared the mother-infant interaction of mothers with SMI to a group of community-based ill mothers and a group of healthy mothers. After discharge from a MBU where a video feedback intervention was completed, the mothers with SMI had become significantly more sensitive and responsive than the group of community mothers with mental health diagnoses and were as attuned to their infants as the group of healthy controls. This encouraging finding underscores the potential positive impact that a focussed, joint-treatment environment may have on vulnerable dyads where mothers have SMI.

Ramsauer and Achtergarde (2018) completed a systematic review of studies examining the impact of acute and postpartum psychoses on mother-infant interaction and found 17 eligible studies. The authors defined acute postpartum psychoses to include first-onset post-partum psychosis and postpartum relapses of psychoses, such as bipolar disorder and chronic psychosis to typically refer to schizophrenia (Ramsauer & Achtergarde, 2018). However, both acute and chronic psychosis categories included various overlapping diagnoses. Mothers with schizophrenia had poorer child custody outcomes compared to mothers with acute postpartum psychoses (which included acute psychotic, bipolar or affective disorders). After joint inpatient treatment, mothers with acute psychosis were likely to be discharged home with their infant, in contrast to mothers with schizophrenia who were at greatest risk of separation from their infant following discharge. Psychosocial factors such as a lower rate of comorbidities, better social adaptation and more effective social support were found in the acute postpartum psychosis groups, which may explain the difference in custody outcome. Although infants of mothers with schizophrenia were judged by clinicians to be at greater risk of harm, the actual risk of harm appeared comparable to those from mothers with affective disorders, leading the authors to consider that mothers with schizophrenia may experience harsher judgements than mothers with affective disorders (Ramsauer & Achtergarde, 2018). Studies of observed mother-infant interaction reported poorer quality of mother-infant interaction when compared to healthy mothers without a mental disorder. Impaired social behaviours were more commonly found in infants of mothers with postpartum psychosis. Studies where mothers with schizophrenia were compared to psychiatric controls revealed mixed results. Some studies reported poorer quality of interaction in the schizophrenia group, while others did not find significant differences between the groups. Strikingly, mothers with acute psychosis or schizophrenia consistently rated their bonding more positively than mothers with postpartum depression, but these ratings were not consistent with clinician ratings of mother-infant interaction. The review found that mothers with acute postpartum psychosis had healthier interactions with their infants when compared with mothers with schizophrenia on aspects such as responsiveness, sensitivity, intrusiveness, and attentiveness (Ramsauer & Achtergarde, 2018).

The differences in diagnostic groupings, timing of assessment and small sample sizes made it difficult for the authors to draw definitive conclusions about how acute postpartum psychoses impact mother-infant interaction when compared to chronic psychoses (Ramsauer & Achtergarde, 2018).

A recent case control study by Shenoy et al. (2019) examined the association between parenting style and facial emotion recognition deficits in mothers with schizophrenia compared to a healthy control group. The schizophrenia group was more likely to have a lax parenting style, but groups did not differ in over-reactivity or hostility in parenting styles. The authors noted that the similar rates of over-reactivity and hostility is in contrast to common social perspectives regarding the parenting patterns of mothers with schizophrenia, who are often viewed as hostile, aggressive or abusive (Shenoy et al., 2019). Scores for negative symptoms, and in particular blunted affect, were correlated with a lax parenting style, which was in keeping with passivity and withdrawal tendencies associated with negative symptoms. In terms of the child's psychosocial environment, a lack of warmth in the mother-child relationship, inadequate parental supervision and experiential privation were significantly associated with the group of mothers with schizophrenia. These characteristics may also be associated with inattention and withdrawal due to negative symptoms, which the authors suggested should be assessed regularly at follow-up consultations (Shenoy et al., 2019). Compared to the healthy mothers, mothers with schizophrenia had more difficulty identifying low- and high-intensity emotions of sadness, anger, disgust, and surprise. The authors found a significant negative correlation between facial emotion recognition deficits and negative symptoms, in particular blunted affect. Factors such as duration of illness, age of onset or positive symptoms were not associated with deficits in emotion recognition scores. There were significant positive correlations between facial emotion recognition deficit, laxness of parenting style and negative symptoms scores. These associations suggest the importance of early intervention and regular monitoring of negative symptoms in this group of women may lead to improved child outcomes.

The literature indicates fairly consistently that when mothers are diagnosed with SMI and specifically schizophrenia, the dyads have poorer quality of mother-infant interaction, more notably prior to intervention. Maternal factors that appear to be consistently found in this group are insensitivity, unresponsiveness or remoteness, and intrusiveness. Infants of these mothers appear to display more avoidance, which has been associated with insecure infant attachment.

The majority of studies investigating the quality of mother-child interaction in mothers with schizophrenia or other forms of psychosis occurred during and/or shortly after admission to a psychiatric MBU. An MBU is a specialised facility that provides inpatient psychiatric care to mothers who experience SMI during the perinatal period without separating mother and infant (Stephenson et al., 2018). These units are prevalent in several developed countries and have shown to lead to improvements in maternal and mother-infant outcomes (Connellan et al., 2017; Stephenson et al., 2018). The absence of dedicated MBUs in the public sector of South Africa mean that mothers who need postpartum psychiatric admission have to be separated from their infants while receiving treatment. Some psychiatric facilities in the Western Cape allow for joint admissions when the mother has sufficiently recovered from an acute episode of illness with the aim of supporting the mother-infant dyad in repairing the impact of the mother's admission on their developing attachment relationship. However, these opportunities are scarce and are hosted within existing adult mental health services, without dedicated maternal and infant mental health specialist services.

To my knowledge, there are no published studies examining the PRF and mother-infant interaction of mothers with peripartum psychosis experiences.

Summary

Attachment theory provides a useful framework within which to understand the factors contributing to the development of psychosis. RF develops within the early attachment relationships and thus provides an important context for examining the quality of mother-infant interaction in mothers who have had psychotic experiences in the peripartum period. There exists a dearth of knowledge on RF within populations with psychosis in general and in mothers with psychosis in particular. Maternal psychosis appears to exert a detrimental effect on the quality of mother-infant interaction in the early postpartum. This study aims to contribute to the body of knowledge focussed on the experiences, PRF, and interaction quality of mothers with psychosis.

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Chapter 4: Methods

This chapter puts forth the central research question, the aims and objectives, as well as the hypotheses of the research project. Thereafter, it provides an overview of the study design, setting, sample and the data collection methods. Each of the measures utilised in the study is discussed and scoring procedures are explained. The statistical procedures employed in the study are provided and the ethical considerations are discussed.

Central Research Question

How do experiences of psychosis in the peri- or postpartum affect parental reflective function (PRF) and quality of mother-infant interaction?

Aims and Objectives

This study aimed to:

i.   determine the PRF of mothers who experienced peri- or postpartum psychosis. PRF will be assessed by the Parent Development Interview (PDI).

ii.   assess the quality of maternal-infant interaction in dyads where the mothers experienced peri- or postpartum psychosis. The quality of mother-infant interaction will be assessed with the Coding Interactive Behaviour (CIB) system as applied to an unstructured play interaction.

iii.   evaluate the association between PRF and the quality of mother-infant interaction, with respect to maternal, infant and dyadic factors observed in this cohort.

Hypotheses

Research Aim 1:

<u>Primary Hypothesis</u>: Mothers with peri- or postpartum psychosis were expected to demonstrate less parental reflective capacity as indicated by an overall RF score lower than 5 on the PDI.

<u>Secondary Hypothesis:</u> Mothers with peri- or postpartum psychosis were expected to demonstrate less than ordinary parental reflective capacity as indicated by scores lower than 5 in relation to themselves (as indicated by Self-focussed RF), to their infants (as indicated by Child-focussed RF), their illness (as indicated by Illness-focussed RF) and in their potential for reflective functioning (as indicated by RF Potential).

Research Aim 2:

<u>Primary Hypothesis</u>: Mothers with peri- or postpartum psychosis were expected to demonstrate moderate or lower quality of mother-infant interaction, as indicated by a total score of 3 and lower on the Coding Interactive Behaviour (CIB) scale.

<u>Secondary Hypothesis:</u> Dyads of mothers with peripartum psychosis were expected to demonstrate moderate or lower quality of Maternal Sensitivity, Limit Setting, Child Social Engagement, and Dyadic Reciprocity, as indicated by scores of 3 or lower on these constructs. Dyads of mothers with peripartum psychosis were expected to demonstrate the presence of Maternal Intrusiveness and Negative Emotionality, Infant Withdrawal, and Dyadic Negative State as indicated by scores of 2 or greater on these constructs.

Research Aim 3:

<u>Primary Hypothesis</u>: There will be a moderate positive correlation between PRF as indicated by the overall PRF score and overall quality of mother-infant interaction, as derived from the total CIB score.

<u>Secondary Hypothesis:</u> There will be moderate positive correlations between PRF and Maternal Sensitivity and Limit Setting, Child Social Engagement and Dyadic Reciprocity. There will be moderate negative correlations between PRF and Maternal Intrusiveness and Negative Emotionality, Infant Withdrawal and Dyadic Negative State.

Summary of Study Design

This was an exploratory study, with a quantitative and descriptive design. It was undertaken with the aim of providing an understanding of the maternal RF, and mother-child interaction of mothers who experienced peri- or postpartum psychosis. This particular cohort of mothers are at risk of developing attachment difficulties due to their experience of peri- or postpartum psychosis.

Due to the relative low prevalence of peripartum psychosis, a convenience sample was taken from Stikland Hospital and the Psychiatric and Obstetrics departments of Tygerberg and Karl Bremer Hospitals. The study focussed on women who had psychotic symptoms during pregnancy and/or the first six months postpartum and who had given birth to a live infant in the last 18 months.

The study commenced in July 2016 and recruitment ended in February 2020 with a total number of 40 participants. Overall PRF was assessed by the Parent Development Interview (PDI) (Slade, et al., 2014) to determine the level of PRF among mothers who experienced peri- or postpartum psychotic symptoms. Secondly, mother-infant interaction was observed and coded with the Coding Interactive Behaviour (CIB) system (Feldman, 1998). Specific domains such as maternal sensitivity, intrusiveness, limit setting, dyadic engagement, child social engagement and withdrawal were evaluated to determine the quality of interaction among dyads where mothers experienced peri- or postpartum psychosis. Finally, parent-infant interaction was correlated with PRF to ascertain the relationship with mother and child observed interactive behaviour.

Study Setting

The study was conducted at Stikland Psychiatric Hospital in Bellville, Western Cape. Stikland Hospital is a secondary level psychiatric hospital providing care for adult in- and outpatients. The hospital operates within the public sector and serves a community with predominantly low- to middle socio-economic circumstances. In 2019, there were a total of 2527 admissions to Stikland Hospital of which 575 were female and 295 admissions were to the acute female wards. Of these acute female admissions, 251 (85.08% of acute admissions, 43.65% of female admissions) were admitted with diagnoses of schizophrenia, schizoaffective disorder or bipolar disorder.

Mothers who are referred for peripartum psychosis to Stikland Hospital would be admitted to one of these acute female wards for involuntary treatment of their symptoms. The facility is staffed with a multi-disciplinary team of clinicians that include nursing staff, a psychiatrist and psychiatry registrars, an occupational therapist, a social worker and a psychologist who provide holistic treatment and interventions. However, postpartum mothers are admitted without their infants to the acute wards as there are no joint acute admission facilities available at the hospital. This differs from many settings within developed countries who offer joint mother and baby admissions.

Eligible women were recruited during pregnancy or shortly after delivery from Stikland Hospital's female acute wards, the outpatient department and a Maternal Mental Health clinic, a specialist perinatal mental health service that operated between 2011 and 2018. In addition to the services at Stikland Hospital, recruitment sites included Tygerberg and Karl Bremer Hospitals. Tygerberg is a tertiary academic hospital that services the Northern Metro subdistricts and several rural districts of the Western Cape. Karl Bremer Hospital is a district hospital that falls within the Tygerberg district and provides secondary services. Both of these hospitals operate within the public sector and provide services to a wide catchment area of individuals of predominantly low- to middle socio-economic circumstances. The Maternal Mental Health clinic was chosen as a recruitment site, because it was one of only two such specialist state clinics in the area; pregnant women were likely to be referred to Stikland Hospital for psychiatric treatment of their psychotic symptoms and they would be followed up at the clinic for a period of six months postpartum. As part of the routine follow-up at the Maternal Mental Health clinic, a clinical medical assessment of the mother took place at six weeks postpartum. Participants were pursued from the Psychiatry and Obstetrics departments of Tygerberg and Karl Bremer Hospitals to identify patients who may not have been referred to Stikland Hospital for follow-up.

Study Sample

Women were considered eligible for the study if they experienced psychotic symptoms during pregnancy or within the first six months postpartum. Eligible participants were mothers of 18 and older, had given birth to a live, healthy infant within the last 18 months and were currently residing with their child. Over the course of the study, the inclusion criteria were expanded from 12 months to 18 months postpartum to allow the recruitment of mothers whose participation was delayed due to relapse of symptoms. At the time of the assessment, mothers were included in the study when they were relatively stable with regard to psychosis. For the purposes of this study, participants were

considered relatively stable if they had not had a psychiatric admission in the last three months and had only mild positive psychotic symptoms as assessed by the Positive and Negative Syndrome Scale (PANSS) at the time of the research visit. In the cases where mothers had been readmitted for psychiatric treatment, they were contacted three months after their discharge to complete the assessment. In cases where mothers exhibited moderate to severe psychotic symptoms as evidenced by a score greater than 3 on any of the PANSS positive subscale items at the time of assessment, inclusion was delayed until the symptoms were resolved.

A total of 40 participants were included in the assessment phase of the study. Two individuals experienced moderate to severe psychotic symptoms at the time of the initial interview as assessed by the PANSS and were offered a later date to complete the interview when their clinical symptoms had stabilized. One mother relapsed and was admitted for psychiatric treatment, which delayed her research visit until 21 months postpartum. The majority of mothers (77.50%) were recruited from Stikland Hospital, with relatively few mothers referred from Tygerberg (10.00%) or Karl Bremer Hospitals (12.50%). Table 1 provides information regarding where participants were recruited from. Peripartum psychosis was identified by the participants' multi-disciplinary treatment teams who verified the presence of psychotic symptoms in the peripartum period. Subsequent to the research visit, information was verified and supplemented by a review of the participant's clinical records.

Table 1. Referral Sources of Study Participants

Referral Source	N (%)
Stikland Hospital	31 (77.50)
Maternal Mental Health Clinic	14 (35.00)
Female Acute Wards	13 (32.50)
Outpatient Clinic	4 (10.00)
Tygerberg Hospital	4 (10.00)
Karl Bremer Hospital	5 (12.50)

Data Collection

Eligible women were contacted and screened by the candidate who explained the nature of the study. As close as possible to six months postpartum, a research visit was arranged with the participant and their infant and where possible, a relative or friend. At the visit, the study procedures were explained, and all questions were answered before obtaining written consent by the participant for herself and her infant to participate in the study.

A detailed interview was conducted with each participant during which relevant demographic and background information regarding their pregnancy, delivery and postpartum period was obtained. Psychotic symptoms at the time of the research visit were assessed by means of the positive subscale of the Structured Clinical Interview for the Positive and Negative Syndrome Scale (SCI-PANSS).

The Parent Development Interview was completed in the participant's home language, and where necessary, a translator was used to assist. As the interview requires the mother to reflect on her own and her child's internal experiences, the interview was conducted without her infant present in order to minimise distractions that may limit her reflective ability. For the duration of the interview, the infant was in the care of a relative, a friend of the participant or where these were unavailable, a research assistant. Two brief, unstructured play interactions were completed at a time when the infant was in a state of alert inactivity. This term refers to a state when the infant is physically quiet and alert and apparently taking in external events (Stern, 1985). These interactions were videotaped, and the same set of developmentally appropriate toys were provided for all dyads.

Research Instruments

Demographic Interview

A detailed interview was completed to gather information on the participant's demographic details, family history and socio-economic circumstances. In addition, information about the patient's medical and psychiatric history and trauma experiences were obtained. The most recent antenatal history, delivery, early bonding, separation periods and infant development were also explored. Where possible, information was verified through an audit of the clinical files. The demographic interview is attached as Appendix B.

Positive and Negative Syndrome Scale (PANSS)

Current psychotic symptoms were assessed by means of the Structured Clinical Interview for the Positive and Negative Syndrome Scale (SCI-PANSS) and scored with the PANSS. The PANSS is a widely-used tool for evaluating symptoms in schizophrenia that has been found to have adequate internal consistency and reliability (Kay et al., 1987) and has been utilized to assess psychopathology symptoms in South African populations (Luckhoff et al., 2019).

Scoring of the PANSS

The Positive symptom subscale items of the PANSS were completed, and each item is assessed on a 7-point Likert scale. The degree to which an item is present is scored from 1, indicating the absence of a symptom to 7, which indicates the extreme severity of a symptom, which has a debilitating impact on the person's functioning (Opler et al., 2006). A score of 2 denotes minimal presence of the symptom, which may indicate the upper extreme of normal limits and a score of 3 indicates the mild presence of a symptom, which does not appear to interfere with the person's functioning (Kay et al., 2006).

The PANSS was employed as a screening tool to identify the presence of positive symptoms of psychosis. In order to only include participants who had at most, mild positive symptoms of psychosis, a cut-off score of 4 on the positive subscale items was used. Scores of 4 and above indicate the presence of at least moderate psychotic symptoms which interfere with the person's functioning (Kay et al., 2006). Participants who scored above 3 on any item were provided with support to access psychiatric review and or treatment, and were provided with a later date to complete the assessment.

PANSS Positive Symptom Subscale Items

The positive symptom subscale consists of seven items that reflect the presence of positive symptoms of psychosis. A brief definition of each item as stated in the scoring manual is provided in Table 2 below (Kay et al., 1987; Kay et al., 2006).

Table 2. Positive Symptom Subscale Items and Their Definitions

Item	Definition
Delusions	Beliefs that are unfounded, unrealistic, and idiosyncratic.
Conceptual disorganisation	Disorganized process of thinking, characterized by disruption of goal-directed sequencing, e.g., circumstantiality, tangentiality, loose associations, non-sequiturs, gross illogicality, or thought block.
Hallucinatory behaviour	Verbal report or behaviour indicating perceptions which are not generated by external stimuli. These may occur in the auditory, visual, olfactory, or somatic realms.
Excitement	Hyperactivity as reflected in accelerated motor behaviour, heightened responsivity to stimuli, hypervigilance, or excessive mood lability.
Grandiosity	Exaggerated self-opinion and unrealistic convictions of superiority, including delusions of extraordinary abilities, wealth, knowledge, fame, power, and moral righteousness.
Suspiciousness or persecution	Unrealistic or exaggerated ideas of persecution, as reflected in guardedness, a distrustful attitude, suspicious hypervigilance, or frank delusions that others mean harm.
Hostility	Verbal and nonverbal expressions of anger and resentment, including sarcasm, passive-aggressive behaviour, verbal abuse, and assaultiveness.

Parent Development Interview (PDI)

The PDI was used to assess the parental reflective function (PRF) of the participants in the study. This interview was developed by Aber and colleagues (1985) and revised by Slade et al. (2014) as a direct measure of parental representations of their child and their developing relationship with the child. In contrast to the AAI, which was the first interview to be coded for RF, the PDI focusses on descriptions of current experiences between parent and child. The interview provides a view of the relationship between parent and child that is in the process of being created and is still evolving. The nature of the relationship is such that it is likely to evoke strong feelings and reactions in the present. The PDI is a semi-structured, autobiographical, memory-based interview that is coded to yield PRF. This measure has been used in South Africa in an observational study of mothers with substance use (Adams, 2020) and intervention studies of high risk mothers (Bain, 2014; Suchman et al., 2020).

In the version used in this study, a total of fifteen questions are coded for PRF for a total RF score. The process of scoring consists of reading the narrative several times and then each of the scored questions (referred to as demand questions), are scored using the guidelines set out below. Upon completion of the scoring, the interview as a whole is given an overall RF score. In addition to the PDI questions, three questions were posed to the mothers to elicit their RF in relation to their illness. These questions were: (i) How has the experience of having a psychiatric illness changed you? (ii)

How do you think the illness influences how you are as a parent? (iii) How do you think the illness has influenced or affected your child?

Scores fall on an 11-point scale, ranging from -1, which denotes negative RF (the narrative is bizarre, devoid of mentalisation or mental states are grossly distorted) and 9, which denotes exceptional RF (the narrative evidences complex or elaborate understanding of mental states) (Fonagy et al., 1998; Slade et al., 2005). The scores and their terminology are set out below in Table 3. For the purposes of this study, RF was predicted to fall below a score of 5, which is considered to be an ordinary level of reflectiveness (Fonagy et al., 1998; Slade et al., 2005).

For this study, five indices of RF were examined; namely, Overall, Potential, Self-focussed, Child-focussed and Illness-focussed RF. The coder assigns a score for Overall RF based on their assessment of the mother's typical capacity for RF during the interview (Slade et al., 2005). RF Potential is the highest score obtained by the mother on any item, which indicates the greatest RF potential that the mother displays in the interview (Suchman et al., 2020). Suchman and colleagues (2010) completed a factor analysis of the PDI and identified two related, but distinct dimensions of RF as measured on the PDI; namely, self-mentalisation and child-mentalisation. Self-mentalisation relates to how the mother mentalises about her own needs, intentions and emotions, and how they influence the interaction between mother and child. Child-mentalisation refers to mentalisation about the child's wishes, intentions and emotions and how these impact the interaction between mother and child. Four questions indicate self-mentalisation and are aggregated to calculate self-focussed RF (Self RF) and six questions indicate child-mentalisation and are aggregated to calculate child-focussed RF (Child RF). The scores of the questions that relate to the mother's experience of her illness are aggregated to calculate illness-focussed RF (Illness RF).

The PDI interviews were audio-recorded in digital format for analysis and coding. The candidate made all possible efforts to conduct the interview in the participant's first language. The candidate obtained consent from the author to use the interview and translate it where necessary (A. Slade, Personal communication, 3 December 2014). The PDI was translated from English to both Afrikaans and Xhosa using the back-translation method. A French version of the PDI was used with a French-speaking participant. The candidate conducted all the interviews in English and Afrikaans and used an interpreter to conduct the interviews in Xhosa and French. All interviews were transcribed and

interviews in Xhosa and French were translated and transcribed into English. Twelve interviews (30.00%) were conducted with the use of a translator, of which one was in French (2.50%).

A single coder coded all of the study's PDI interviews. This coder completed intensive training and a certification process with the test developers who confirmed her coding is in accordance to the required standard. The coder is one of two certified coders in South Africa and is the only coder who is able to do PDI coding in Afrikaans. For these reasons, this coder was selected to complete all the PDI coding for this study.

Indicators of Reflective Functioning (RF)

There are four general types of RF, each with various subtypes (Fonagy et al., 1998; Slade et al., 2005). Each of the general types of RF will be briefly explained below in order to provide context for the scoring of the PDI narratives for RF. Contained within each type of RF, there may be several subtypes included in complex responses.

A. An awareness of the nature of mental states

The subject evidences an understanding of the qualities of mental states. These include: 1) That mental states are opaque and that one cannot always be sure what someone else is thinking or feeling by observation alone. In reference to their children, mothers may indicate that they need to guess or infer what their child's thoughts, feelings or intentions are.

2) That mental states are susceptible to disguise when someone wants to keep their internal experience private. It is noteworthy that infants under the age of 18 months are not capable of intentionally disguising their emotions.

3) Recognising the limits to one's capacity to know what is in another's mind. The mother is attempting to read her child's state of mind, but acknowledges the limitations inherent in doing so.

4) Mental states are tied to expressions of appropriate normative judgements. The parent expresses a recognition that a response is developmentally or psychologically expectable. Examples may include references to the normality of a child's feelings in a particular situation, or given the child's developmental level.

5) Awareness of the defensive nature of certain mental states. This usually refers to a mother's awareness that she may alter her mental state so as to reduce negative affect.

B. The explicit effort to tease out mental states underlying behaviour

Reflective parents will attempt to identify mental states that could explain the child's behaviour which leads to plausible conclusions regarding the associations between mental states and the behaviour of themselves or others. Examples of this type of RF include:

1) <u>Accurate attributions</u> of mental states to self or others. The parent provides a believable account of their own, or their child's behaviour as a function of mental states.

2) Envisioning the possibility that <u>feelings</u> concerning a situation could be <u>unrelated to the external, observable aspects of the situation</u>.

3) Recognition of <u>diverse perspectives</u>. The parent acknowledges that her and her child may perceive a situation or behaviour differently.

4) Taking one's <u>own mental state into account when interpreting</u> the behaviour of others. Parent recognises that their interpretations of a situation may be influenced or distorted by their own thoughts and feelings.

5) Evaluating mental states from the point of view of their <u>impact on one's own or another's behaviour or mental states</u>. This subtype of RF relates to the recognition of a parent that their own mental states influences the behaviour or mental states of themselves and others.

6) Taking into account <u>how you are perceived</u> by others. The parent expresses awareness of how others' perception of them are related to their own actions.

7) <u>Freshness of recall and thinking</u> about mental states. The parent displays the capacity to think spontaneously and vividly about their own and their child's mental states.

C. Recognising developmental aspects of mental states

Central to a parent's sensitive responsiveness and reflective awareness is the awareness that a child's experience of the world and their mental states are in a state of change and growth which is situated in a developmental context. Parents who use this type of RF are able to reflect on their child's changing capacity for emotion regulation, containment and expression.

1) Taking an <u>intergenerational perspective</u>, making links across generations. The parent recognises that their own thoughts and feelings carry with them influences of their own childhood and therefore impact on the child's experience of themselves and others.

2) Taking a <u>developmental perspective</u>. The parent displays an awareness of age-related changes in their child's perspective and expressive capacity.

3) <u>Revision</u> of thoughts and feelings about childhood in view of changes in understanding <u>since childhood</u>. The adult parent recognises that their own beliefs may have changed since they were children and that this change in perspective has led to changes in their behaviour or attitudes.

4) Envision <u>changes</u> of mental states from <u>past to present</u> and <u>present to future</u>. The parent notes changes in their own or their child's understanding or feelings with the passage of time.

5) Envision <u>transactional processes</u> between parent and child. The parent recognises that there is a mutual, interactional process between two mental states of parent and child, with at least three consecutive transactions needed.

6) Understanding developmental factors that determine <u>affect regulation</u>. There is an awareness that the child's emotional state is dependent on the parent's capacity to regulate and/or reduce their arousal.

7) Awareness of family dynamics. The parent acknowledges the interdependent nature of the family system in which mental states of individual members influence and impact the attitudes and feelings of other members in the family.

D. Mental states in relation to the interviewer

The interview demonstrates the parent's awareness of mental states through their reflectiveness in interaction with the interviewer.

1) Acknowledging the separateness of minds. The parent provides evidence of high RF when they explicitly acknowledge that the interviewer does not share their mental state.

2) Not assuming knowledge. The parent provides additional explanations or clarifies the context in their narrative in order to help the interviewer keep track of the story being recounted.

3) Emotional attunement. The parent considers the interviewer's likely emotional reaction to the material being provided and takes this into account when relaying the narrative.

Scoring of the PDI

Each question of the PDI is scored for the highest level of mentalisation it contains. When there are bizarre or unintegrated responses, or there is a significant shift in mentalising of a particular question, the score may be lowered to reflect the shift in quality. Upon completion of the scoring of each of the passages, the entire interview is then assigned an overall RF score. Table 3 outlines the 11 scale points and their interpretations as used in the scoring system.

Table 3. Terminology and Interpretation of Reflective Functioning Scores

RF score	Manual Terminology for Score	Interpretation of RF Score
-1	Negative RF	Responses are actively evasive, hostile, bizarre or inappropriate in the context of the interview.
0	Disorganised disavowal	Responses indicate disavowal, with lapses in reasoning and fluctuation in mentalising, likely due to defensiveness.
1	Absent, but not repudiated RF	Indicates passive evasion with little to no hostility. The passage should not contain any evidence of an awareness of mental states and the interviewer would not have gained insight into the mental state of the subject after receiving the response. Often these responses contain references to behaviour, but not mental states and could contain distortions.
2	Vague or inexplicit references to mental states	Responses contain a vague reference to mental states, but are limited and inexplicit in their attempt to identify or 'tease out' the mental states. The reader can infer mental states, but this is not done explicitly by the interviewee.
3	Questionable or low RF	Narrative includes an effort by the subject to mentalise, but there is no evidence that the subject has a genuine understanding of the mental state or it's implication. Although the narrative may include mental state language, the subject's understanding appears superficial, cliched or unconvincing.
4	Rudimentary of inexplicit mentalising	Responses include mental state language and there may be attempts to associate (link) mental states with behaviours or other mental states which elevates the response from a 3. However, the narrative lacks the sophistication or elaboration to be classified as definite RF (score of 5).
5	Definite or ordinary RF	There is convincing evidence that the subject has a model or their own and of others' minds. The subject is able to make sense of their experience in terms of thoughts and feelings. There are elements of explicit mentalising, but mentalising breaks down in the face of more complex experiences such as conflict or ambivalence.
6		Responses that contain evidence of explicit mentalising, which is more elaborate than what is considered definite RF (score of 5), but do not meet criteria for marked RF (score of 7).
7	Marked RF	There is evidence of explicit reflection and must contain one of the following five characteristics: 1) Response is sophisticated; it includes at least two indices of RF 2) Contains an original perspective that may be unusual or surprising

RF score	Manual Terminology for Score	Interpretation of RF Score
		3) Response is complex or elaborate and evidences consideration of multiple mental states as they relate to each other in a person. 4) There is consideration for mental states that are understood within a causal sequence – how they arose, how behaviour was influenced and what impact there is on subsequent perceptions, beliefs and desires. 5) The narrative contains references to the interactional nature of mental states as they impact on one another or the mental states of another person.
8		Reponses meet all the criteria for marked RF (score of 7), but only one of the two criteria for full or exceptional RF (score of 9), therefore warranting a score of 8.
9	Full or exceptional RF	A response should showcase the features of marked RF (score of 7) to a remarkable degree, or maintain marked levels of mentalising while discussing a particularly difficult or emotionally charged subject which would be considered exceptional. Passages should also be of a strikingly personal nature, convincing the rater of the accuracy and personal significance of the account in a way that is complex and demonstrates a full awareness of the important aspects contained in the account.

Types of Limited RF

In developing the PDI, Slade and colleagues (2005) observed several types of limited RF, which will be briefly summarised. The types correspond to those identified by Fonagy and colleagues (1998) in the original RF manual, and refer only to passages rated as low (RF from -1 up to 3).

1. Rejection of RF

Some parents respond with defensiveness and denial of their responses when they experience a question as being too intrusive or personal. Possible reactions include hostility towards the interviewer, incongruence in the responses that do not seem plausible, or evasion of the question.

2. Unintegrated, bizarre or inappropriate RF

This type refers to narratives that leave the rater confused when trying to understand the attribution of mental states and may be divided into two subtypes. Firstly, a failure of the participant to give details regarding the cause or effect of a mental state, where the respondent fails to recognise the

connection between affective states and beliefs. Secondly, where an inappropriate cognition or bizarre attribution of the mental state interferes with the meaning of the response.

3. Disavowal of RF

Although similar to the first type (rejection of RF), disavowal also reflects an absence of mentalising, but in the absence of overt hostility. The narrative reflects passivity and evasion, rather than aggression.

4. Distorting or self-serving RF

Statements that are highly egocentric in their interpretation of mental states fall into this category and refer to statements where the parent overestimates their impact on the thoughts, behaviour or feelings of their child. Examples of this type are thought to be rare, as parents do play a significant role in the lives of their children. This type may be more prevalent when the RF scale is used with the AAI, which is based on memories of previous events and where respondents may be more likely to have developed idiosyncratic or self-serving explanations for previous events.

5. Naïve or simplistic

Narratives that fall into this type appear simplistic, one-dimensional and can be considered a social cliché. There is an absence of curiosity or an effort to understand their own mental state or that of their child. Language use does not reflect a complex understanding of mental states and does not take more than one perspective into account.

6. Overly-analytical or hyperactive RF

Although some narratives may at first glance appear highly reflective and complex, a lack of meaning emerges when studied in more depth. A limited understanding is reflected, even if there are elaborate explanations. Passages may contain several examples of jargon which do not convey true reflectiveness.

7. Excessive focus on personality and behaviour

Interviews that are characterised as being of this type, contain several references to personality traits or behaviours to describe the child. The parent appears to lack consideration of the child's internal,

affective experiences and the impact that these affective states have on the parent's thoughts, feelings and behaviours. Similarly, the parent appears unable to acknowledge the impact that their own thoughts and feelings may have on their child, choosing instead to focus on overt behaviours as solely impacting the child.

Coding Interactive Behaviour (CIB)

The Coding Interactive Behaviour (CIB) system was used to assess the quality of mother-infant interaction (Feldman, 1998). The CIB is a global system for rating mother-child interaction that has been used across a variety of cultures, including in a pilot intervention study in South Africa (Suchman et al., 2020). The CIB has good psychometric properties, has been validated in studies of normative and high-risk children and has demonstrated sensitivity to age, cultural background and social-emotional risk (Feldman & Eidelman, 2009; Leclère et al., 2014). The coding system provides an assessment of mother and child interaction from video recordings of unstructured play interactions.

This coding procedure encompasses the global nature and flow of the interaction, taking the infant's developmental level and both parties' individual style into consideration. The coding system utilises a dyadic system approach in which interaction is considered to be a bi-directional and dynamic process, which is made up of three domains; namely, a parental contribution, an infant contribution and dyadic coordination (Beebe et al., 2010; Feldman, 1998).

For the play interaction, the dyad was provided with a container with developmentally appropriate toys in two sequential episodes. The parent was asked to engage in play with her infant as would be usual for them, with the toys available if they choose to use them. The first episode is with a set of toys determined to be familiar to most infants (e.g. soft toy, rattle, ball), with the aim of acclimatising the dyad to the activity. The toys provided in the second episode are intended to elicit mild uncertainty or curiosity in the child (e.g. noise maker, ball with flashing light) with the aim of activating the child's need for a secure base during exploration. The toys provided were consistent for all dyads. All play interactions were video-recorded in digital format but only the second episode was coded using the CIB. Where the language spoken was not English or Afrikaans, the dialogue was translated into English for coding purposes. The coder has completed extensive training under the guidance of the test developer in order to be certified. She is one of only two individuals certified to do the coding in South Africa.

Constructs Measured with the CIB

The coding system consists of 42 codes, which include item scales for rating adult, child and dyadic behaviours. Behaviours observed in the interaction are rated between 1 and 5, with a score of 1 indicating the absence of a behaviour, 3 indicates the moderate presence of a behaviour and 5 indicates the consistent presence of a behaviour (Feldman, 1998). The CIB coding sheet is provided in Appendix D. The overall quality of mother-infant interaction, as determined by the Overall CIB score was predicted to fall below a score of 3 in this sample of mothers. A score of 3 reflects a moderate quality of interaction (Feldman, 1998). A score of 3 was chosen, as it corresponds to the quality of mother-infant interaction found on the CIB in mothers with psychiatric difficulties (Suchman et al., 2016).

Item codes are aggregated to provide composite scales that can be compared with samples from other studies. Each of the composite scales and their underlying item codes will be briefly discussed.

Maternal Scales

Four composite maternal scales may be derived from the CIB; namely, maternal sensitivity, intrusiveness, limit setting and negative emotionality.

Sensitivity

Maternal sensitivity consists of the averaged scores for the mother's acknowledgment of her child's communications, her elaboration of imitated actions, focussing her gaze on and joint attention with the infant, displaying a warm and positive affect, uses appropriate vocalisations, displays an appropriate range of affect, displays resourcefulness in the interaction and affectionate touch, provides a supportive and consistent presence. Interactions that are child-led are deemed to reflect greater maternal sensitivity. A higher score on maternal sensitivity is desirable.

Intrusiveness

Mothers' behaviour is coded for items that reflect forceful physical handling of the child, overriding or disrupting the infant's attention or behaviour, displays of negative affect towards the infant in the form of anger, or hostility, displays of anxiety, expressions of criticism or dissatisfaction with the infant. Interactions that are parent-led are judged to be more intrusive. A lower score for intrusiveness is desirable.

Limit setting

The limit setting composite consists of maternal behaviours that aim to provide the infant with appropriate, yet flexible structure, reflects a consistency in the mothers' style of behaviour and the parent supports the infant in maintaining his attention on the joint activity. For limit setting, a higher score is considered desirable.

Negative Emotionality

This composite scale consists of expressions of negative emotions within the interaction and towards the infant. The negative emotions include expressions of anger, hostility, criticism or dissatisfaction and anxiety. Lower scores for negative emotionality are desirable.

Infant Scales

Three composite scales for coding the infant's behaviour during the play interaction is available; namely, child social engagement, withdrawal and compliance.

Child Social Engagement

This composite score is made up of codes that reflect to which degree the infant initiates interaction with the parent, displays appropriate vocalisation and positive affect, gazes at the parent or maintains a joint attention, is able to maintain an alert state, and is focussed on the interaction. Child-led interactions are deemed to reflect greater child social engagement and a higher score is desirable.

Withdrawal

Infant signals of withdrawal include expressions of negative affect, such as crying or angry expressions, the display of withdrawal or detachment within the interaction, expressions of labile affect and behaviours that signal avoidance of the parent. Lower scores for infant withdrawal are desirable.

Compliance

The composite scale of compliance consists of codes related to the degree of the infant's compliance in response to their parent's requests, their reliance on the parent for assistance to achieve a goal and the degree to which the infants is able to persist in one activity. The codes that make up this composite score is only coded from the age of one year. A higher score for compliance is considered desirable.

Dyadic Scales

The two composite scores reflecting the quality of the dyad's interaction include reciprocity and negative state.

Dyadic Reciprocity

The composite scale for dyadic reciprocity reflects the degree of synchrony that exists between parent and infant during their interaction. The scale consists of codes that reflect the degree of synchrony or give-and-take in the interaction, adaptation that each member of the dyad makes in response to the other's signals and the fluency of the interaction. Higher scores for the dyadic reciprocity scale are desirable.

Dyadic Negative State

This composite scale reflects the degree of tension, discomfort and avoidance within the interaction, as well as the level of constriction in terms of emotional expressiveness, exploration and enthusiasm observed in the interaction. Lower scores for dyadic negative state are desirable.

A total interaction score (Total CIB) is calculated by taking into account maternal sensitivity, limit setting, child social engagement and dyadic reciprocity. A higher total interaction score is desirable.

Statistical Analysis

Data was analysed using STATA version 15. Demographic data is presented as frequencies (percentages) for categorical data, and as mean with standard deviation (SD) or median with interquartile range (IQR) for numerical data. The primary research hypotheses were evaluated by descriptive statistics and Pearson's correlation coefficients were calculated for correlations between PRF variables and interaction variables. In order to examine supplementary associations, two-sample t-tests were conducted to test for associations between demographic, pregnancy and postpartum variables and study variables related to PRF and quality of interaction. Equal variance was assumed where appropriate. In instances where variables with more than two categories were examined, a one-way analysis of variance (ANOVA) was used. For relationships that were significant, a Bonferroni post-hoc test was used to indicate which two-way comparison was significant. Standard linear regression was used to test for association between length of separation and the study variables of

PRF and quality of mother-infant interaction. The standard for significance for all analysis was $p < 0.05$ for marginal significance and $p < 0.01$ for statistical significance. Correlation sizes were interpreted as very high ($r = .90 - 1.00$), high ($r = .70 - .89$), moderate ($r = .50 - .69$), and low ($r = .30 - .49$) (Hinkle, Wiersma, & Jurs, 2009).

Ethical Considerations

Permission to conduct the study and ethical approval for the study was obtained in accordance to the provisions of the Health Research Ethics Committee (HREC) at the University of Stellenbosch (S16/01/014), as well as the Provincial Research Committee. Approval to conduct the study at Stikland Hospital was provided by the Management of Stikland Hospital. Additional approval was received to recruit participants from Tygerberg and Karl Bremer Hospitals. The HREC and Provincial health research approval letters are provided in Appendixes E and F. The study was conducted in accordance with the International Committee for Harmonization (ICH) Good Clinical Practice Guidelines and the SA GCP as well as the Declaration of Helsinki.

Participation took place on a voluntary basis and participants were informed that they may leave the study at any time, without such a decision impacting on the clinical care that they receive at Stikland Hospital. Mothers were able to grant consent on behalf of themselves and their infants. In cases where clinical concerns arose about the infant's development or safety, referrals were made to appropriate agencies for further evaluation and intervention. Mothers who experienced peri- or postpartum psychosis were considered vulnerable individuals, and further referrals were actively facilitated to ensure continuity of care.

Every effort was made to preserve the confidentiality of participants. Participant information was de-identified for the purposes of the study. Information about the patient's participation in the study, including (but not limited to) video recordings, interview transcripts and demographic information were assigned unique participant numbers. A data set linking the participant's name and number was kept in a secure location that was only accessible by the candidate. Data analysis was only done on the de-identified information. Notes, interview transcripts, transcribed notes and any other identifying participant information were kept in a locked file cabinet in possession of the candidate. Video-recordings were stored electronically and include password protection or digital encryption with restricted access granted only to the collaborators of the study. Secure file transfer protocols were

used when sending or receiving information to and from coders and no information was stored on cloud services. Information from this research was used solely for the purpose of this study. Any publications would not identify any participants and their anonymity would be maintained. Participant data was kept confidential, except in cases where the candidate was legally and/or ethically obligated to report specific incidents. These incidents include, but were not limited to, incidents of abuse and suicide risk. Participants were provided with transport to and from the research visit(s). Due to the long duration of the research visit, participants were provided with refreshments during the procedure and were offered breaks as needed. All participants were provided with a stipend for their participation in the study.

Informed Consent

Mothers received a thorough explanation of the study in their first language and were informed of the nature of the information gathered for the purposes of the study. The candidate provided the information and obtained consent from participants. The study description and consent form provided to participants prior to participation in the study is provided in Appendix A. Written informed consent was obtained prior to any information obtained. Care was taken to ensure that mothers' capacity to provide informed consent was not impaired by their mental state. The candidate determined the participant's capacity to provide consent by ensuring their understanding of the information provided and by making sure she appreciated the consequences of her decision at the time the study was explained, prior to obtaining informed consent. None of the mothers were involuntary or assisted users as defined by the Mental Health Care Act (2002) at the time of providing consent or at the time of the assessments. Mothers were able to provide consent for participation on behalf of themselves and their infants.

Summary

This chapter first outlined the research question, aims and hypotheses identified for the study. Thereafter, an overview of the study methodology was provided, which set out the design, measurement instruments and statistical analysis of data. Finally, the ethical considerations were presented. The following two chapters will present the results of the study. Chapter 5 is in the form of an article accepted for publication, which sets out the participant characteristics and pregnancy outcomes of the sample. Chapter 6 presents the results of the measurement instruments and statistical analyses.

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Chapter 5: Results – Demographic Characteristics and Pregnancy Outcomes

This chapter outlines the demographic characteristics and pregnancy outcomes of the participants in the study. This manuscript is accepted for publication in the *African Journal of Reproductive Health* and has been formatted to conform to the journal's specifications. The journal's impact factor is 0.700, URL: https://www.ajol.info/index.php/ajrh).

Original Research Article

Pregnancy outcomes, early separation, and psychiatric relapse experienced by South African women with peripartum psychosis: A descriptive exploration

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Abstract

The peripartum is associated with increased incidence of severe mental illness (SMI), a greater occurrence of psychotic symptoms and psychiatric admissions. This study aimed to describe the psychiatric, medical and psycho-social risk factors affecting South African mothers who experienced peripartum psychosis. Using a prospective, descriptive design, we conducted a detailed interview and supplementary information was collected by review of clinical records. The study examined the accounts of forty mothers who experienced peripartum psychosis between 6 and 18 months postpartum. Descriptive statistics for demographic and clinical variables were completed with SPSS for Windows, version 25. Pregnancies were predominantly unplanned, and more than half of participants reported prenatal substance use. Medical or psychiatric problems during pregnancy were common and the majority of dyads experienced periods of early separation. Socio-demographic factors exacerbated the challenges this group of women at high risk face, in providing nurturing care to their infants. Results highlight the need for close follow-up for women with SMI, with particular attention to substance screening and psychosocial stressors. Integrated maternal and infant mental health services are recommended.

Keywords

Peripartum psychosis, pregnancy outcome, mother-infant separation, prenatal substance use, postpartum relapse

Introduction

Pregnancy and the postpartum period are often experienced as a time of great joy and excitement for many women. However, this phase is also associated with vulnerability to mental illness, risk of relapse of pre-existing mental illness, and the development of new psychiatric symptoms[1].

During pregnancy and postpartum, there is an increased incidence of severe mental disorders (SMI), which may include disorders such as schizophrenia, bipolar and schizoaffective disorder[2]. Postpartum, there is a dramatic increase in the frequency of psychotic symptoms and psychiatric admissions[2,3]. Factors that contribute to the increased incidence of relapse and new-onset mental disorders during the perinatal period include discontinuing medication during pregnancy, sleep deprivation, hormonal variation, as well as the physical and psychological demands of pregnancy and infant care[2,4]. Serious mental illness (SMI) in the perinatal period can have potentially devastating consequences for the mother, infant and family system and may adversely affect the mother's capacity to parent[5,6]. The presence of psychotic disorders in particular, places the mother and unborn infant at greater risk for adverse obstetric and neonatal outcomes, psychiatric admission and early separation[7].

Expectant mothers who have a pre-existing psychotic disorder may be at greater risk for obstetric complications than those mothers who develop postpartum psychotic disorders[8], with the risk for stillbirth or low birthweight doubling if the psychotic episode occurred during pregnancy[9]. Pregnancy outcomes of mothers with affective psychoses carry double the risk for a preterm birth, low birthweight or small for gestational age babies[10].

Although women with schizophrenia and bipolar disorder have somewhat lower fertility rates than women in the general population, the majority of these women are parents[2]. However, Miller and Finnerty[11] reported a greater likelihood that the pregnancies of women with schizophrenia would be unplanned and unwanted when compared to women without the disease. Du Toit and colleagues[12] identified several risk factors contributing to unplanned pregnancies in a sample of South African women with psychiatric illness. These include being of younger age, two or more pregnancies in the past, being of mixed ancestry, African or Indian ethnicity, being unmarried, below tertiary level of education, being unemployed, low socio-economic status, substance abuse, previous psychiatric admissions and previous suicide

attempts. The presence of maternal mental illness in combination with unplanned pregnancy significantly increases the vulnerability of these mothers to adverse pregnancy outcomes[12,13].

Substance use during pregnancy also contributes to the risk for adverse obstetric and child outcomes[14]. Zhao and colleagues[15] reported that poorer birth outcomes among women with mental illness were more likely when the mother used substances during pregnancy. The high rates of substance use among South African pregnant women has been recognised by two surveys of women attending Midwife Obstetric Units in Cape Town where alcohol consumption and smoking were found to be especially prevalent[16,17].

According to Cès and colleagues[18], mothers suffering from psychotic disorders are at greater risk of being separated from their infants due to hospitalization or other adverse incidents. During the first half of the twentieth century, separation between mothers with postpartum psychotic disorders and babies were considered advantageous for both parties[19]. The emergence of social psychiatry, changes in psychiatric treatment, and research by Bowlby[20] and Spitz[21] on the adverse effects of early separation from attachment figures questioned this approach[19]. Recent studies have provided further support for the notion that early separation between infants and mothers have adverse consequences. Separations between the mother and infant occurring during the infant's first year pose a risk to the development of a secure attachment relationship[22]. Howard and colleagues[23] found that mother-infant separation within the first two years of life was associated with child negativity at age three and aggression at ages three and five. In recognition of the benefits of maintaining proximity of mothers and infants during the postpartum period, psychiatric mother-baby units (MBUs) emerged in several developed countries with favorable outcomes for postpartum mothers[24].

In 1959, the first joint admissions of mothers with schizophrenia and their babies by Baker and colleagues[25] demonstrated that joint admissions were shorter, mothers were more likely to care for their babies upon discharge and had lower rates of relapse than mothers admitted without their babies. This practice has now become more widespread and is recommended by the National Institute for Health and Clinical Excellence[26]. Despite the benefits of joint admissions, mothers with psychotic disorders may still be separated from their infants. Cès and colleagues[18] analyzed joint admissions of mothers with psychotic disorders and their infants and linked early separation to the placement of the mother in an institution

during childhood, being single, early hospitalization of the baby and maternal psychiatric decomposition during pregnancy.

Mothers utilizing mental health services may experience more significant challenges in their roles as parents, which may be of particular significance during infancy, when there is greater dependence on the parent[27]. Children in care of mothers with psychiatric illnesses may be more vulnerable to developing insecure or disorganized attachment, particularly when maternal psychopathology is severe and prolonged, and when other risk factors such as parental trauma are present[28]. The presence of both maternal psychiatric symptoms and separations may adversely affect the quality of the mother-child relationship, as well as parental sensitivity and capacity[29].

Specific features of psychotic disorders, such as withdrawal, delusional thinking, disorganized behavior and reduced responsiveness, may separately and in combination hamper the mother's ability to provide a consistent, attuned presence for her infant, which may compromise the development of a secure attachment, especially if early separation occurs[5,23].

Nurturing care, defined by the World Health Organization (WHO) as "giving young children opportunities for early learning, through interactions that are responsive and emotionally supportive"[30(p2)], emphasises the importance of the period from pregnancy to age 3. The components that make up nurturing care include: behaviors, attitudes, knowledge regarding caregiving, stimulation, responsiveness and safety[31]. Mothers with peripartum psychosis may require additional support in the provision of nurturing care in order to provide adequate opportunities for learning and development for their infants.

In the South African context of widespread socio-economic risks and limited resources, it is imperative to identify vulnerable dyads for early intervention. To our knowledge, there has not been a study among South African women with experiences of peripartum psychosis. This descriptive study of South African mothers who experienced serious psychiatric symptoms in the peripartum aims to provide a description of the socio-demographic factors and pregnancy outcomes for this group of women. By gaining a better understanding of the potential difficulties that mothers with this severe form of peripartum psychiatric illness face, dyads who may be at particular risk for adverse maternal and infant outcomes may be identified for further treatment.

Methods

Study Design

This prospective study followed a quantitative and descriptive design. Forty mothers who had experienced peripartum psychosis were recruited from three public hospitals in South Africa between 2016 and 2020.

Study Setting

The recruitment sites included Stikland Hospital, a psychiatric facility providing care for adult in- and outpatients; Tygerberg Hospital, a tertiary and academic hospital; and Karl Bremer Hospital, a district hospital in the Western Cape. These hospitals serve a South African community with predominantly low to middle socio-economic circumstances.

Participants

We used purposive sampling to specifically recruit mothers who had experienced peripartum psychosis. Mothers were eligible if they gave birth to a healthy infant in the last 18 months, if they experienced psychotic symptoms during their pregnancy and/or within six months postpartum and if they resided with their infants. In cases where mothers exhibited moderate to severe psychotic symptoms at the time of assessment, inclusion was delayed until the symptoms were resolved.

Procedure

Participants were referred to the study and invited for a research visit at Stikland Hospital between 6 and 18 months postpartum. Participants were determined to have capacity to provide consent for the study if they understood the information provided and could appreciate the implications of their participation[32]. Participants were informed of the nature and procedure of the study, and informed consent was obtained. Thereafter, demographic information was collected through a detailed interview and information was supplemented by review of clinical records. The positive subscale of the Structured Clinical Interview for the Positive and Negative Symptoms Scale (SCI-PANSS) was completed to assess for current psychotic symptoms.

Peripartum psychosis was identified by multi-disciplinary treatment teams who verified the presence of psychotic symptoms in the peripartum period and the primary investigator

reviewed clinical records for additional information. At the time of the research visit, the stability of symptoms was evaluated from clinical records and a clinical interview with all participants. Two individuals experienced moderate to severe psychotic symptoms at the time of initial interview as assessed by the SCI-PANSS and were offered a later date to complete the interview when their clinical symptoms had stabilized. One mother relapsed and was admitted for psychiatric treatment, which delayed her research visit until 21 months postpartum.

Instruments

Demographic Interview

A demographic interview explored aspects of the mothers' accounts of their current circumstances, pregnancy, birth and postpartum experiences. Demographic information collected include age, level of education, marital status, periods of separation, medical and psychiatric history. Where possible, information was verified through an audit of the clinical files.

Positive and Negative Syndrome Scale (PANSS)

Current psychotic symptoms were assessed by the Structured Clinical Interview for the Positive and Negative Syndrome Scale (SCI-PANSS). The Positive and Negative Syndrome Scale (PANSS) is a widely-used tool for evaluating symptoms in schizophrenia that has been found to have adequate internal consistency and reliability[33] and has been utilized to assess psychopathology symptoms in South African populations[34]. Positive subscales were completed, and each item assessed on a 7-point Likert scale ranging from 1 (absent) to 7 (extreme). A cut-off score of 4 on the positive subscale items was used. Scores of 4 and above indicate the presence of at least moderate psychotic symptoms. Participants who scored above 3 on any item were provided with support to access psychiatric review and provided with a later date to complete the assessment.

Data Analysis

Data were analyzed with SPSS for Windows, version 25. The distribution and descriptive statistics are provided for demographic and clinical variables.

Ethical Considerations

Permission to conduct the study and ethical approval for the study was obtained in accordance to the provisions and approval of the Health Research Ethics Committee of Stellenbosch University (S16/01/014). Consent for participation in the study was obtained from the participants. Participation in the study was voluntary and the participants could withdraw at any point without coercion or any negative consequences. Participants were provided with transport, received refreshments during the procedure and were given payment for their participation.

Results

Demographic Information

Forty mothers were eligible for the study and their demographic information is provided in Table 1. Mothers ranged in age between 21 and 44 years (mean=29.6) and had between 1 (35.0%) and 4 children (12.5%). The majority of mothers achieved a secondary level of education (70.0%). Less than a third of the mothers were married (30.0%), with the remainder categorized as in a relationship (35.0%) or single (35.0%). Half of the mothers were unemployed (50.0%), and less than a quarter (22.5%) receive a disability grant. The majority of mothers (85.0%) had an annual household income of less than R100 000 (approximately $6 685).

Table 1. Demographic Variables (n=40, unless otherwise noted)

Variable	Statistic
Mean age (years)	29.6 (*sd* = 5.2)
Level of education	**% (*n*)**
Primary school	12.5 (5)
Secondary school	70.0 (28)
Tertiary education	17.5 (7)
Relationship status	
Single	35.0 (14)
In a relationship	35.0 (14)
Married	30.0 (12)
Employment status	
Unemployed	50.0 (20)
Employed	27.5 (11)
Receiving a disability grant	22.5 (9)
Socio-economic status as indicated by annual household income	
Receiving a social grant	10.0 (4)
<R100 000	75.0 (30)
<R350 000	7.5 (3)
>R350 000	2.5 (1)
On private medical aid	5.0 (2)

Lifetime and Current Stressors

Almost two-thirds of the mothers (*n*=26; 65.0%) reported a lifetime experience of trauma. Fewer mothers reported a lifetime history of abuse (*n*=18, 45.0%). A slightly higher proportion reported lifetime physical abuse (*n*=11; 27.5%) than sexual abuse (*n*=9; 22.5%). The majority of abuse was experienced prior to falling pregnant (*n*=16; 88.9%) and less than a third occurred in the postpartum (*n*=5; 27.8%). Partners were reported as perpetrators of abuse by 8 individuals (44.4%), however 4 of the 5 mothers who reported postpartum abuse, experienced this at the hands of their partners (80.0%).

The most frequently reported psychosocial stressor at the time of assessment, was lack of partner support (*n*=20; 50.0%), with financial difficulties reported by 15 mothers (37.5%). Other stressors endorsed were physical or verbal abuse by partner (*n*=7; 20.0%), and unemployment of the participant (*n*=5; 12.5%). Although the majority of mothers were in a significant relationship, half reported experiencing a lack of partner support as their main stressor.

Maternal Medical and Psychiatric Information

Bipolar disorder was the most prevalent diagnosis (40.0%), 13 were diagnosed with schizophrenia (32.5%), and 3 mothers had a diagnosis of major depressive disorder with psychosis, schizophreniform or schizoaffective disorder (7.5%). The distribution of diagnoses and comorbidities are provided in Table 2. All but one of the mothers (97.5%) have had at least one psychiatric admission, with half (50.0%) being admitted prior to their pregnancy, 25.0% admitted during their pregnancy and over half (55.0%) admitted subsequent to their pregnancy. One mother was admitted during late pregnancy and discharged 8 weeks after delivery. Of the further 22 mothers who were admitted during the postpartum period, 12 (30.0%) were admitted within 12 weeks postpartum. Total scores for the positive subscale of the PANSS at the time of the assessments ranged between 7 and 16, with a median of 9, and a mean of 9.4 (standard deviation, sd=2.1). The median item score was 2 and the maximum score for any item was 3, which indicates the presence of mild symptoms that do not generally interfere with functioning.

Table 2. Primary Psychiatric Diagnosis and Comorbidity

Primary psychiatric diagnosis	% (n = 40)
Bipolar disorder	40.0 (16)
Schizophrenia	32.5 (13)
Schizoaffective disorder	7.5 (3)
MDD with psychosis	7.5 (3)
Schizophreniform disorder	7.5 (3)
Substance-induced psychotic disorder	5.0 (2)
Comorbid diagnosis categories	
Substance use disorder	17.5 (7)
Personality disorder/traits	5.0 (2)
Intellectual disability	7.5 (3)
Conversion disorder	2.5 (1)

Pregnancy and Delivery

More than four-fifths of the pregnancies were unplanned (85.0%), but only 7 (17.5%) were unwanted. The frequencies of substances used during pregnancy are provided in Table 3. Substance use during pregnancy was reported by over half (n=21; 52.5%) of mothers, with cigarette smoking being most prevalent (45.0%), and lower rates of alcohol use (22.5%) and illicit substances (17.5%). Eight mothers (20.0%) used more than one substance during pregnancy. Post-pregnancy, some mothers abstained from using substances, with 19 mothers (47.5%) reporting substance use at the time of interview. The majority of mothers (n=28; 70.0%) reported medical or psychiatric problems during their pregnancy and almost half (n=18; 45.0%) reported psychotic symptoms during their pregnancy.

Births took place between 30 weeks and 43 weeks gestation, with a mean gestational age of 38 weeks. Twenty-one mothers delivered via vertex delivery (52.5%) and there were twelve emergency caesarean sections (30.0%). A high number of mothers (n=31, 77.5%) self-reported complications during the delivery, including "pre-eclampsia" (n=3; 10.3%), "cervix not dilating" (n=4; 13.8%), "tearing" (n=9; 31.0%), and "excessive pain" (n=6; 20.7%). Mothers reported that infants experienced "distress" (n=4; 13.8%), "were placed in an incubator" (n=7; 24.1%), "were cyanotic or blue" or "needed oxygen" (n=5; 17.2%), and had "a low birth weight" (n=7; 24.1%).

Table 3. Use of Substances During Pregnancy

Substance	Substance abuse group % (n = 21)	Total sample % (n = 40)
Smoking	85.7 (18)	45.0 (18)
Alcohol	42.9 (9)	22.5 (9)
Illicit drugs	33.3 (7)	17.5 (7)

Post-partum: Separation

The majority of mothers (n=29; 72.5%) experienced a form of separation from their infants and over half (n=24; 60.0%) were separated for a week or more. Reasons for separation included medical procedures (n=10; 34.5%), maternal psychiatric admission (n=22; 75.9%), and infants visiting or staying with family members (n=5; 17.2%). Six mothers (20.7%) returned to work, which were not classified as separations. Separations ranged from the time of birth to 1 year 9 months postpartum and the length of separation ranged from 1 day to 9 months, with an average duration of

51 days. Eleven mothers (37.9%) experienced multiple separations from their infants during the first 18 months postpartum. Timing of and reasons for separation are summarized in Table 4.

The majority of mothers (n=31; 77.5%) identified themselves as the primary caregiver of their infants and family members assumed primary responsibility for the remaining infants. Four mothers did not live with their infants full-time, one due to work commitments and three due to arrangements made following their psychiatric admissions.

Table 4. Early Separation Between Mother and Infant

Time of separation	% (*n* = 29)	Length of separation in days	Average length of separation in days
After birth	37.9 (11)	1 to 93	19.7 (*sd* = 30.2)
0- 3 months postpartum	41.4 (12)	2 to 212	42.8 (*sd* = 55.0)
3 - 6 months postpartum	27.6 (8)	4 to 246	80.1 (*sd* = 69.2)
6 - 12 months postpartum	17.2 (5)	14 to 76	38.2 (*sd* = 21.0)
12 - 24 months postpartum	6.9 (2)	17 to 27	22 (*sd* = 5.0)
Unknown	6.9 (2)	2	2 (*sd* = 0.0)
Reasons for separation			
Psychiatric admission of mother	75.9 (22)	7 to 107	46.2 (*sd* = 28.6)
Medical reasons	34.5 (10)	1 to 14	5.4 (*sd* = 4.8)
Child visiting or staying with family members	17.2 (5)	2 to 246	100.6 (*sd* = 106.3)

* 11 dyads experienced more than one separation

Discussion

This study aimed to describe the socio-demographic factors and pregnancy outcomes for South African mothers who experienced peripartum psychosis, in order to understand the impact of psychotic experiences on mothers' experience of parenthood. This group of mothers experienced several factors that contributed to their vulnerability, including obstetric and birth complications, separations from their infants, emergence and/or relapse of psychiatric symptoms, high rates of trauma, substance abuse and significant psychosocial stressors.

The rate of unplanned pregnancy (85.0%) in this group of mothers with peripartum psychosis is higher than the 47.2% rate in mothers with mental illness examined by Du Toit and colleagues[12] and that of a group of mothers attending Midwife Obstetric Units (MOUs) in Cape Town (68.2%)[17]. The higher rate of unplanned pregnancy could be a consequence of the nature of their preexisting psychiatric illnesses. Similar to previous studies of mothers with mental illness, the majority of mothers who took part in this study experienced psychiatric and obstetric problems during their pregnancy and delivery[7,8]. However, the present study focused on peripartum psychosis, which comprises a significantly smaller portion of the population of mothers with mental illness than those described in Hoirisch-Clapauch *et al.*[7] and Jablensky *et al.*[8].

Prenatal substance use was common (52.5%), with the use of tobacco being the most commonly used substance. The rates of smoking (45.0%) and alcohol use (22.5%) reported here, were higher than what Vythilingum and colleagues[16] found among women presenting for antenatal visits at a MOU in Cape Town (smoking in 36.8%, and alcohol use in 20.2%). The self-reported prevalence of alcohol use was lower than the 36.9% found by Williams and colleagues[17] among pregnant women attending MOUs in Cape Town. Illicit substance use was reported by 17.5% of women in this study, which exceeded the rates of 4% and 3.6% found in other South African studies in pregnancy[16,17]. The higher rate of substance use found in this sample may be due to multiple demographic and risk factors found among individuals with psychosis[35]. The relative prevalence of prenatal substance use is cause for concern, as it is associated with adverse pregnancy outcomes and long-term negative child health, behavior and development outomes[14]. Similar to findings reported by Zhao, McCauley and Sheeran[15], the presence of both maternal mental illness and substance abuse may have contributed to the frequency of obstetric problems and poor birth outcomes found in this study.

Multiple psychosocial risk factors were prevalent among this group of women, including lack of partner support, financial difficulties, trauma and abuse histories, similar to findings reported by Stein *et al.*[36]. Our study found a lower rate of lifetime abuse (45.0%) than the 63.8% reported by Vythilingum and colleagues [37] among women attending an obstetric clinic in Cape Town, South Africa. Although the reported abuse was experienced predominantly prior to pregnancy, most of the women who reported abuse during pregnancy experienced abuse by their partners. These factors may have contributed to the fact that 53.1% of mothers experienced an emergence or relapse of symptoms that necessitated psychiatric admission, a rate higher than reported by Munk-Olsen and colleagues[38].

Early separation was prevalent among the mother-infant dyads in this study (71.9%), the majority of which were as a result of psychiatric admissions and occurred during the first three months postpartum. Separations during this early period are particularly concerning, as infants rely on their mother's physical proximity as the primary indicator of her availability, which is necessary for the development of secure mother-infant attachment[23]. Our study found a higher rate of separation than Cès and colleagues[18], who reported separation in 27.2% of mothers with psychotic disorders following joint admission to mother-baby units. During these joint admissions, mother-infant interaction could be observed: 4.4% of mothers displayed abusive behavior, while more than half displayed neglect (51.7%)[18]. During pregnancy, 56.0% of women in their study experienced decompensation, a higher rate than the 45.0% of mothers in our study who experienced psychotic symptoms. Factors similar to those identified by Cès and colleagues contributed to our group of mothers' early separation from their infants, including maternal psychiatric relapse during pregnancy, infant health, and characteristics of mothers' environmental support and social history[18]. Although the separations in our study were not due to social service intervention, the potential infant risks for neglect or maltreatment remain. Due to the absence of treatment facilities where joint admissions and longitudinal observation of mother-infant interaction were possible, potential risks could not be assessed for each dyad.

Implications for healthcare policy and practice

In combination, the risk factors described in this study highlight the challenges facing a group of women who, as a consequence of their psychiatric illness, may experience challenges in fulfilling their parental role. Mothers with SMI, particularly those with non-affective psychoses frequently experience potentially modifiable risk factors that may jeopardize their pregnancy outcomes[6], similar to those of the population studied in the present sample, such as substance abuse and relational difficulties. Concerningly high rates of substance abuse during pregnancy highlight the need for routine screening and psychoeducation at primary care level, implementation of preventative interventions, with close follow-up and if needed, targeted substance abuse interventions within this population. In addition to identifying the psycho-social risk factors during pregnancy, these women may benefit from close obstetric and psychiatric follow-up during pregnancy and beyond. As there appears to be an increased risk for post-natal relapse and admission, more frequent psychiatric follow-up is indicated for early detection of relapse. An integrated care strategy is necessary to provide tailored psycho-social support to assist these mothers in developing healthy attachments to their infants in light of the frequent early separations experienced. These interventions may be in the form

of home visits, referral to parent-infant clinics for outpatient support, provision of parenting support or mother-infant psychotherapy that support the attachment relationship. Future pregnancies carry a significant risk for post-partum psychosis[39], and women may benefit from specific counselling regarding reproductive risks and subsequent vulnerability to illness.

Separations between mothers and infants due to mother-only psychiatric admissions pose several dilemmas, including refusal of and longer periods of admission, undermining of breastfeeding, and transfer of responsibility of caring for the infant to spouses and extended family[40]. The National Institute for Health and Care Excellence (NICE) recognizes that women with mental illness may experience difficulties within the mother-infant relationship and recommends admission to a specialized mother-and-baby unit if the mother requires inpatient treatment within the first year postpartum[26]. Patients admitted to mother-baby units typically require specialist care in the fields of Psychiatry and Paediatrics, with consultation to Obstetricians and Gynaecologists in the early postpartum[41]. The current absence of public sector mother-baby units in the Western Cape region of South Africa, where some of the risks to mother-infant interaction and attachment could be observed and potentially mitigated, is of particular concern in this group of women who experienced frequent early separations and multiple psychosocial stressors in addition to their mental illness.

The establishment of mother-baby units within the South African public health sector would provide post-natal psychiatric and psychological care for this group of women who may otherwise be at high risk of developing insecure or disorganized attachments with their infants. These units could provide specialist care and interventions to these vulnerable dyads, which would limit the need for and length of separation between mother and infant within the early postpartum period. In the absence of dedicated mother-baby units, the accommodation of mothers with mental illness and their infants within maternal and newborn health (MNH) units at district facilities is recommended. Given the elevated risks associated with pregnancy and delivery for this group of women, close psychiatric and obstetric follow-up and targeted substance abuse interventions may improve maternal and child outcomes. The development of greater awareness and early detection of SMI symptoms of bipolar disorder by implementing screening in antenatal settings is also recommended.

Limitations

The generalizability of this data is limited due to the small sample size and heterogenous nature of the sample. The sample size was comparable to observational studies of mothers with serious mental illnesses in the postpartum[42–44], as these patients were relatively scarce. Information on pregnancy and obstetric complications, substance use and stressors were obtained from self-reports, which may have been more reliable if obtained through obstetric records and structured assessment tools. As no long-term follow-up information is currently available, the implications for infant outcomes are unclear. However, the high rate of complications reported may have impacted negatively on mothers' experiences of pregnancy and delivery, and their early experiences of their infants.

Conclusion

This group of mothers who experienced peripartum psychosis faced several challenges, including early separation from their infants, high rates of peripartum psychiatric relapse and admission, substance abuse difficulties, socio-economic risk factors and widespread trauma histories. All these factors impact on the caregiving environment and may compromise the mothers' ability to provide sensitive and nurturing care. This is a sample of women at high risk who would benefit from close follow-up by a multi-disciplinary team able to assist with a comprehensive bio-psychosocial care approach to the mother-infant dyad.

Acknowledgements

Contribution of authors

JV conceptualised and designed the study, collected and analysed data, prepared the manuscript in collaboration with AB and DJHN. AB and DJHN provided inputs in finalising the manuscript. All authors approved the manuscript.

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Chapter 6: Quantitative Results

Introduction

This chapter will expand on the demographic and experiential data as reported in the preceding article and will illustrate the results from the outcome variables of parental reflective function and interaction characteristics. Where appropriate, tables and graphs will be used to further illustrate the frequencies and associations of the variables.

The central research question of the study was: "How do experiences of psychosis in the peri- or postpartum affect parental reflective function (PRF) and quality of mother-infant interaction?". To this end, mothers were recruited at least six months postpartum if they experienced peri- or postpartum psychosis. The preceding chapter's manuscript, in combination with the first section of this chapter, titled "Demographic Characteristics and Pregnancy Outcomes", provides the results of the characteristics and experiences of mothers with peri- and postpartum psychosis. The following section, titled "Results for Parental Reflective Function" addresses the study's first aim, namely to determine the PRF of mothers who experienced peri- or postpartum psychosis. The subsequent section, titled "Results of Parent-infant Interaction" focusses on the study's second aim of assessing the quality of maternal-infant interaction of mothers who experienced peri- or post-partum psychosis. The final section, titled "Correlations Between Parental Reflective Functioning and Interaction Variables" addresses the study's final aim of determining the relationship between PRF and quality of mother-infant interaction in the present sample of mothers with peri- and postpartum psychosis.

Demographic and Clinical Results

Demographic information pertaining to the relationship status, level of education, employment status and socio-economic status is reported in the manuscript submitted for publication and which is contained in the preceding chapter. The total sample of 40 mothers ranged in age between 21 and 44 years, with a mean of 29.55 years and a standard deviation (SD) of 5.32. About a third of mothers were single (35.00%), with less than a third married (30.00%) and the remainder reported being in a relationship (35.00%). The majority of mothers achieved a secondary level of education (70.00%). Half of the mothers were unemployed (50.00%), and the majority reported an annual household income of less than R100 000 (85.00%).

Almost two-thirds of mothers reported a lifetime experience of trauma (65.00%), with less than half reporting a lifetime history of physical (27.50%) or sexual abuse (22.50%). Just over a quarter of these mothers reported abuse in the postpartum period ($n = 5$; 27.78%), with a greater proportion of mothers experiencing abuse prior to falling pregnant ($n = 16$; 88.89%). There were equal numbers of mothers diagnosed with schizophrenia (40.00%) and bipolar disorder (40.00%), with the remainder diagnosed with major depressive disorder (7.50%), schizoaffective disorder (7.50%) or a substance-induced psychotic disorder (5.00%). Demographic variables are summarised in Table 4.

Table 4. Demographic Variables ($n = 40$, unless otherwise noted)

Variable	Statistic
Mean Age (years)	29.55 ($SD = 5.32$)
Relationship Status	**% (n)**
Single	35.00 (14)
In a relationship	35.00 (14)
Married	30.00 (12)
Level of Education	
Primary school	12.50 (5)
Secondary school	70.00 (28)
Tertiary education	17.50 (7)
Employment Status	
Unemployed	50.00 (20)
Employed	27.50 (11)
Receiving a disability grant	22.50 (9)
Socio-economic Status as Indicated by Annual Household Income	
Receiving a disability grant	10.00 (4)
<R100 000	75.00 (30)
<R350 000	7.50 (3)
>R350 000	2.50 (1)
On private medical aid	5.00 (2)
Previous Experience of Trauma	
Yes	65.00 (26)
No	35.00 (14)
History of Abuse	
Yes	45.00 (18)
Physical abuse	27.50 (11)
Sexual abuse*	22.50 (9)
Primary Psychiatric Diagnosis	
Schizophrenia	40.00 (16)
Bipolar disorder	40.00 (16)
Major Depressive Disorder with psychosis	7.50 (3)
Schizoaffective disorder	7.50 (3)
Substance-induced psychotic disorder (SIPD)	5.00 (2)

*One participant reported both physical and sexual abuse

More than four-fifths of pregnancies were unplanned (85.00%) and just over half of the mothers reported using a substance during their pregnancy (52.50%). Cigarettes was the most widely-used substance during pregnancy (45.00%), with less than a quarter of mothers reporting alcohol use (22.50%). Less than half of mothers reported symptoms of psychosis during pregnancy (45.00%). Table 5 includes the pregnancy variables of the participants.

Table 5. Pregnancy Variables

Variable	Statistic % (*n*)
Planning of Pregnancy	
Planned	15.00 (6)
Unplanned	85.00 (34)
Substance Use in Pregnancy	
Yes	52.50 (21)
No	47.50 (19)
Type of Substance Used During Pregnancy	
Cigarettes	45.00 (18)
Alcohol	22.50 (9)
Illicit substance	17.50 (7)
Experience of Psychosis During Pregnancy	
Yes	45.00 (18)
No	55.00 (22)

The infants of the participants ranged in age between 6 and 21 months at the time of assessment, with a mean age of 10.43 months ($SD = 4.20$). Almost two thirds of the infants were female ($n = 26$; 65.00%) and approximately a third were first- ($n = 14$; 35.00%) or second-born ($n = 14$; 35.00%). The ages of the infants at the time of the research visit is presented in Figure 2.

Figure 2. Ages of Infants
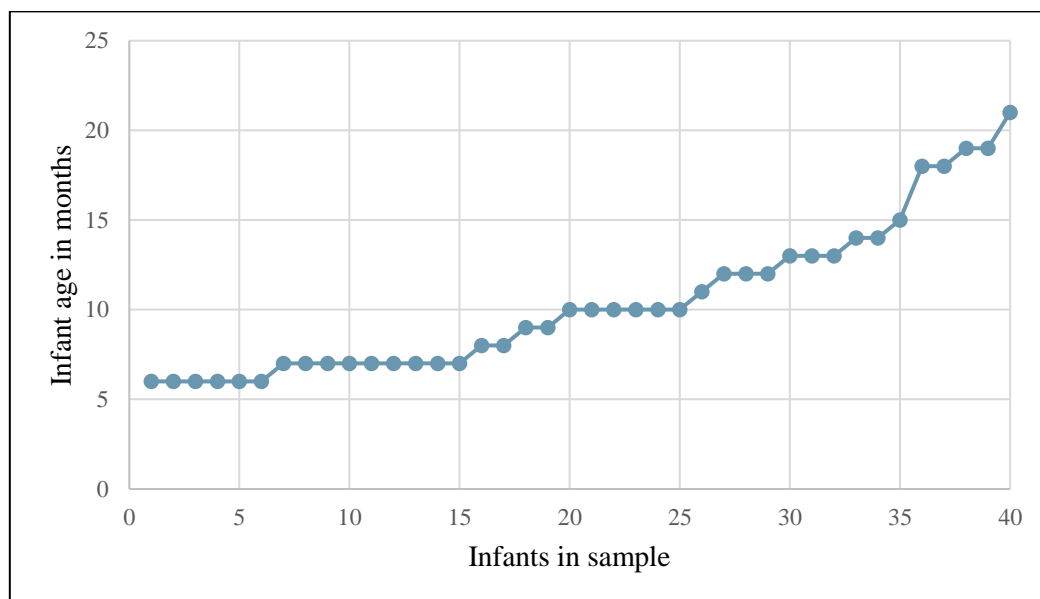
In the postpartum, more than three-quarters of the mothers in the present sample were identified as their infant's primary caregiver (77.50%). More than half of mothers had a psychiatric admission in the postpartum period (57.50%), with about half of these admissions occurring in the first three months postpartum (52.17%). Table 6 reflects the postpartum variables.

The length of separation between mothers and infants ranged from 1 to 246 days, with an average of 37 days. The length of separation for all the sample participants is presented in Figure 3. The majority of mothers experienced at least one separation from their infants that lasted at least a week (60.00%). These separations mostly occurred in the first three months postpartum (58.33%). For separations of a week or longer, the length of separation ranged between 7 and 246 days, with a mean of 60.79 days and a median of 42 days (Q1 = 21.5; Q3 = 78.5).

Table 6. Postpartum Variables

Variable	Statistic % (*n*)
Primary Caregiver	
Mother	77.50 (31)
Other	22.50 (9)
Postpartum Psychiatric Admission	
Yes	57.50 (23)
No	42.50 (17)
Timing of Postpartum Admission	
Between birth and 3 months	52.17 (12)
After 3 months	47.83 (11)
Separation for Longer Than One Week	
Yes	60.00 (24)
No	40.00 (16)
Timing of Separation	
Birth to 3 months	58.33 (14)
Between 3 and 6 months	20.83 (5)
After 6 months	20.83 (5)

Figure 3. Length of Separation Between Mothers and Infants
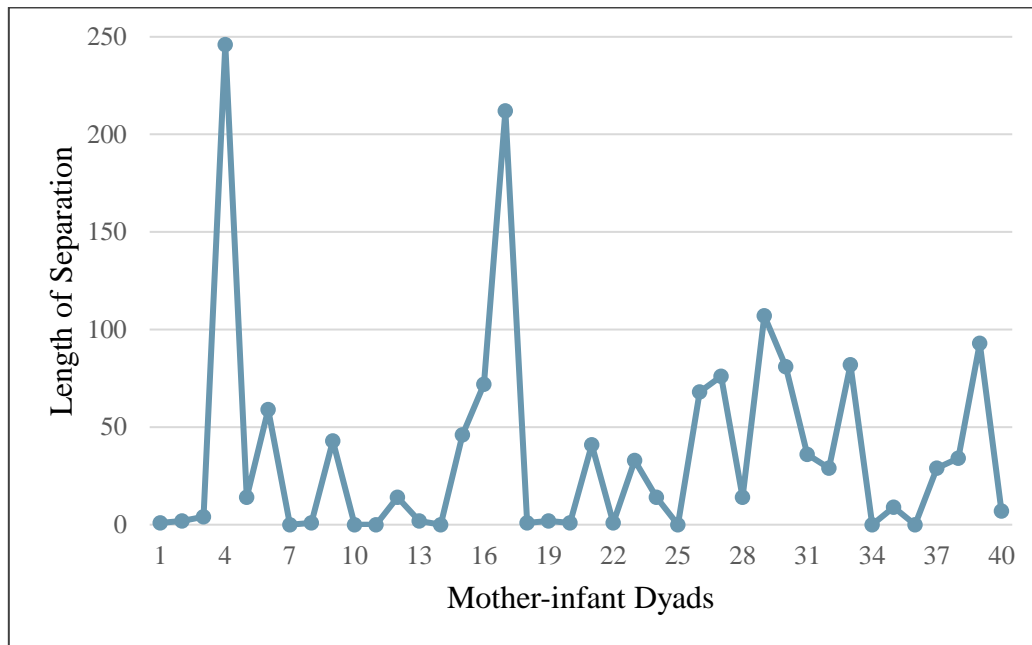
This section summarised the demographic information, pregnancy and postpartum variables of the mothers who participated in the study. The following two sections will provide the results for the quantitative measures for the variables parent reflective functioning and quality of mother-infant interaction, respectively.

Results for Parental Reflective Function (PRF)

The ranges for parental reflective function (PRF), as scored from the Parent Development Interview (PDI), are shown in Table 7. Participants' Overall PRF scores ranged between 1 (Absent, but not repudiated RF) and 6 (between Ordinary and Marked RF), the majority of which fell between 3 (Low RF) and 6. A total of 65.00% of mothers achieved an Overall PRF score lower than 5, indicating lower than Ordinary reflective functioning. RF Potential scores, as illustrated by the highest score obtained by each participant, ranged between 3 (Low RF) and 8 (between Marked and Exceptional RF). All but one of the participants exhibited at least Ordinary RF Potential (97.50%). One mother did not complete the Illness-focussed questions; hence the sample size is 39 for Illness-focussed RF (Illness RF). Illness RF ranged between 1 and 6.33, with a mean of 3.24 and a standard deviation of 1.22. The majority of mothers (90.00%) achieved a score lower than 5 for Illness RF. The distribution of Overall and RF Potential scores are illustrated in Figure 4.

Table 7. Range of Parental Reflective Function Scores

	Min	*SD*	p25	Median	Mean	p75	Max	*n*
Overall PRF	1.00	1.15	3.00	4.00	4.10	5.00	6.00	40
Self RF	1.50	1.09	3.25	3.75	3.83	4.50	6.25	40
Child RF	1.00	1.10	3.20	3.60	3.76	4.50	6.75	40
Illness RF	1.00	1.22	2.33	3.00	3.24	4.33	6.33	39
RF Potential	3.00	1.07	5.50	7.00	6.33	7.00	8.00	40

Minimum score = -1, Maximum score = 9

Figure 4. Distribution of Overall Parental Reflective Function and Reflective Function Potential
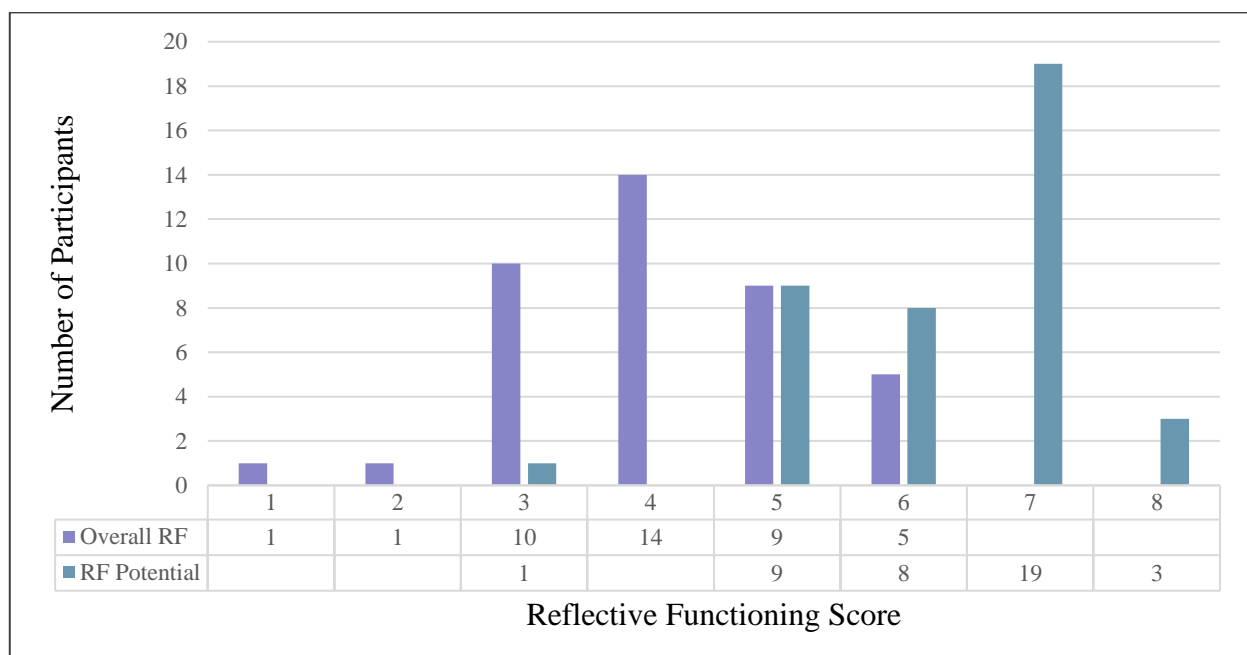
Self-focussed RF (Self RF) and Child-focussed RF (Child RF) ranged from 1 (Absent, but not repudiated RF) to 6 (between Ordinary and Marked RF) and shared a similar distribution pattern. The majority of mothers achieved scores lower than 5 for Self RF (90.00%) and Child RF (87.50%). The distribution of Self-focussed RF in relation to Child-focussed RF is provided in Figure 5.

Figure 5. Distribution of Self-focussed Reflective Functioning in Relation to Child-focussed Reflective Functioning
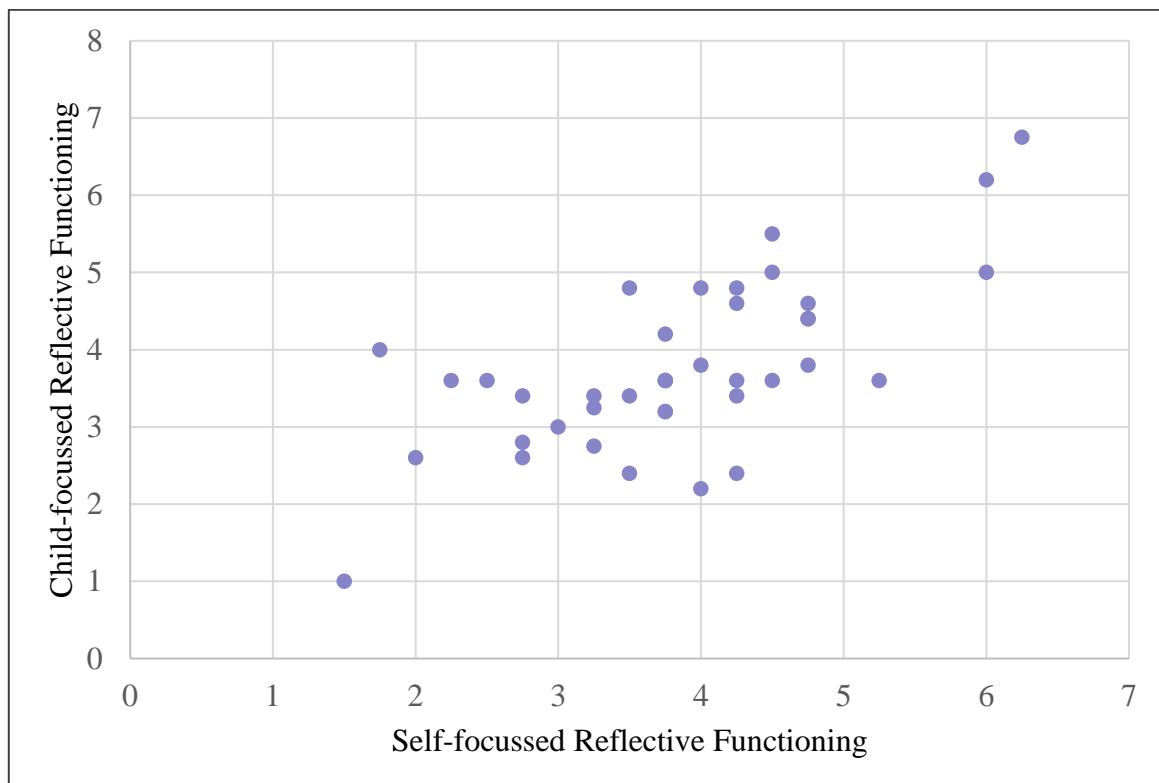
A Pearson product-moment correlation coefficient was computed to assess the relationship between the types of RF derived from the PDI. Table 8 summarises the results of the relationships between variables. The various types of reflective function are highly inter-correlated. Strong, positive correlations were found between Overall RF and all other types of RF measured in this study. Moderate positive correlations were found between the factors of Self RF, Child RF, Illness RF and RF Potential.

Table 8. Correlations Among the Reflective Function Variables

	Overall PRF	Self RF	Child RF	Illness RF	RF Potential
Overall PRF	1				
Self RF	.82**	1			
Child RF	.74**	.69*	1		
Illness RF	.72**	.68*	.57*	1	
RF Potential	.76**	.67*	.62*	.64*	1

* Moderate correlation (r = +/-.50 to +/-.69); ** Strong correlation (r = +/-.70 to +/-.89); *** Very strong correlation (r = +/-.90 to +/- 1)

Demographic Variables and Parental Reflective Function

This section will provide the associations between PRF and demographic, pregnancy, and postpartum variables. First, the associations with Overall PRF will be presented, followed by the associations with RF subtypes.

Overall Parental Reflective Function (PRF)

Demographic Variables and Overall PRF

Demographic details of the mother's age, relationship status, level of education, employment status, history of trauma, and primary diagnosis were used for supplementary examination of associations between demographic variables and overall PRF. Table 9 displays the significance of the association between overall PRF and selected demographic variables. The relationship status categories of married and in a relationship were combined to examine the association between being in a relationship versus being single with the study variables. In order to examine the relationship of education with study variables and in particular PRF, participants were grouped according to having limited education and compared with those who had higher levels of education. For this reason, participants with only a primary school education were grouped together and compared to participants who had a secondary level or higher education. Individuals receiving a disability grant were grouped with those participants who were unemployed in order to examine the relationship of employment status with the study variables.

A single relationship status was marginally associated with a lower level of overall PRF (p = .045). Individuals who only have a primary level of education had a marginally lower overall level of PRF (p = .020). The age of the mother (p = .529), her employment status (p = .188), history of trauma (p = .916) and her diagnosis (p = .374) were not significantly related to the participants' overall level of PRF.

Table 9. Association Between Demographic Variables and Overall Parental Reflective Functioning

Demographic	n	Overall PRF Mean	CI Lower	CI Upper	p value
Total Sample	40	4.10	3.73	4.47	
Age of Participant					
21 to 29	17	4.24	3.65	4.83	.529
30 to 44	23	4.00	3.50	4.50	
Relationship Status					
Single	14	3.57	2.87	4.28	.045*
Married or in a relationship	26	4.38	3.97	4.80	
Level of Education					
Primary	5	3.00	1.04	4.96	.020*
Secondary and Tertiary	35	4.26	3.91	4.60	
Employment Status					
Employed	11	4.45	3.83	5.08	.188
Unemployed and disability grant	29	3.97	3.51	4.43	
History of Trauma					
Yes	26	4.12	3.68	4.55	.916
No	14	4.07	3.30	4.84	
Primary Diagnosis[1]					
Schizophrenia	16	3.69	3.11	4.27	.374
Bipolar disorder	16	4.38	3.79	4.96	
MDD with psychosis	3	4.33	2.99	5.67	
Schizoaffective disorder	3	4.00	2.66	5.34	
SIPD	2	5.00	3.36	6.64	

* p < .05; ** p < .01; [1] – ANOVA; CI – Confidence interval; MDD – Major depressive disorder; SIPD – Substance-induced psychotic disorder

Pregnancy characteristics and Overall PRF

Factors associated with the pregnancy experiences of participants were compared for their association with the overall PRF score and is presented in Table 10. The overall level of PRF was not significantly associated with factors such as having a planned or unplanned pregnancy (p = .636), substance abuse during pregnancy (p = .978), or experiences of psychosis during pregnancy (p = .621).

Table 10. Association Between Pregnancy Characteristics and Overall Parental Reflective Functioning

Demographic	*n*	Overall RF Mean	CI Lower	CI Upper	*p* value
Total Sample	40	4.10	3.73	4.47	
Planned Pregnancy					
Planned	6	3.83	2.29	5.38	.636
Unplanned	34	4.15	3.76	4.53	
Substance Use in Pregnancy					
Yes	21	4.10	3.50	4.69	.978
No	19	4.11	3.63	4.58	
Psychosis During Pregnancy					
Yes	18	4.00	3.46	4.54	.621
No	22	4.18	3.64	4.72	

* p < .05; ** p < .01; CI – Confidence interval

Postpartum characteristics and Overall PRF

Aspects of the dyad's postpartum experience were examined to determine their association with overall PRF and is presented in Table 11. The mother's overall level of PRF was not significantly related to whether the mother was the infant's primary caregiver (p = .143), whether the mother had a postpartum psychiatric admission (p = .707), the dyad was separated for longer than 1 week (p = .679), or when the separation took place (p = .340).

Table 11. Association Between Postpartum Characteristics and Overall Parental Reflective Functioning

Demographic	*n*	Overall RF Mean	CI Lower	CI Upper	*p* value
Total Sample	40	4.10	3.73	4.47	
Primary Caregiver					
Mother	31	4.29	3.93	4.65	.143
Other	9	3.44	2.28	4.60	
Postpartum Psychiatric Admission					
Yes	23	4.04	3.47	4.62	.707
No	17	4.18	3.72	4.63	
Postpartum Separation for Longer Than One Week					
Yes	24	4.04	3.49	4.59	.679
No	16	4.19	3.70	4.67	
Timing of Separation[1]					
Birth to 3 months	14	3.79	3.07	4.50	.340
Between 3 and 6 months	5	4.80	3.60	6.00	
Between 6 and 12 months	5	4.00	2.80	5.20	

* $p < .05$; ** $p < .01$; [1] – ANOVA; CI – Confidence interval

The significance of the relationship between the length of separation between mother and infant, and Overall PRF was explored by conducting Spearman's correlation with the length of separation as a continuous variable. The distribution of length of separation was non-normal, and the variable was log-transformed in order to test for normality. The relationship between length of separation and Overall PRF is provided in Table 12. The length of separation between mother and infant had a negligible negative correlation to Overall RF (*rs* = -.15).

Table 12. Association Between Length of Separation and Overall Parental Reflective Functioning (*n* = 24)

Variable	Overall PRF
Length of Separation	-.15

* Moderate correlation (*rs* = +/-.50 to +/-.69); ** Strong correlation (*rs* = +/-.70 to +/-.89); *** Very strong correlation (*rs* = +/-.90 to +/- 1)

RF Subtypes

Demographic Variables and RF Subtypes

Mothers' age, relationship status, level of education, employment status, history of trauma, and primary diagnosis were examined for associations with the RF subtypes. Table 13 reflects the significance of the associations between RF subtypes and the demographic variables. A single relationship status had a statistically significant association with lower scores for Child RF ($p = .008$), Illness RF ($p = .006$) and RF Potential ($p = .007$), and was marginally associated with lower Self RF scores ($p = .019$). Level of education was marginally associated with RF Potential. Mothers with only a primary level of schooling had marginally lower RF Potential scores ($p = .010$). Employment status was marginally associated with only RF Potential, with employed mothers displaying marginally greater RF Potential ($p = .021$). Mothers' age, her history of trauma, and her primary psychiatric diagnosis were not significantly associated with any of the RF subtypes.

Pregnancy Characteristics and RF Subtypes

Variables related to the mothers' pregnancy were compared with the RF subtypes to determine their degree of association. Table 14 reflects the significance of the associations between pregnancy characteristics and RF subtypes. None of the pregnancy variables were significantly associated with the subtypes of RF.

Postpartum Characteristics and RF Subtypes

Characteristics of the dyad in the postpartum were examined to determine their association with the subtypes of RF. Table 15 displays the strength of the associations between postpartum characteristics and RF subtypes. Self RF was marginally related to the mother's caregiver status. Mothers who were identified as the primary caregiver of their infants displayed marginally greater Self-focussed RF ($p = .033$). None of the RF subtypes differed significantly for the variables of postpartum psychiatric admission, separations for longer than a week, or timing of the separation.

Table 13. Association Between Demographic Variables and Reflective Functioning Subtypes

Demographic	n	Self RF	CI Lower	CI Upper	p value	Child RF	CI Lower	CI Upper	p value	Illness RF[1]	CI Lower	CI Upper	p value	RF Potential	CI Lower	CI Upper	p value
Total Sample	40	3.83	3.48	4.18		3.76	3.41	4.11		3.24	2.84	3.64		6.33	5.98	6.67	
Mother's Age																	
21 to 29	17	3.78	3.22	4.34	.799	3.76	3.19	4.34	.987	3.22	2.53	3.90	.919	6.35	5.81	6.90	.889
30 to 44	23	3.87	3.39	4.35		3.76	3.28	4.24		3.26	2.74	3.78		6.30	5.83	6.78	
Relationship Status																	
Single	14	3.30	2.76	3.84	.019*	3.13	2.54	3.72	.008**	2.48	1.75	3.20	.006**	5.64	4.98	6.31	.007**
Married or in a relationship	26	4.12	3.68	4.55		4.10	3.69	4.51		3.67	3.26	4.08		6.69	6.35	7.03	
Level of Education																	
Primary	5	2.95	1.15	4.75	.051	3.32	1.38	5.26	.345	2.27	1.32	3.21	.056	5.20	3.36	7.04	.010*
Secondary and Tertiary	35	3.96	3.62	4.30		3.82	3.47	4.18		3.38	2.96	3.81		6.49	6.17	6.80	
Employment Status																	
Employed	11	3.82	3.19	4.45	.960	3.82	3.19	4.45	.814	3.57	2.82	4.31	.292	6.82	6.41	7.22	.021*
Unemployed and disability grant	29	3.84	3.40	4.27		3.74	3.29	4.18		3.13	2.64	3.61		6.14	5.70	6.58	
History of Trauma																	
Yes	26	3.91	3.54	4.28	.521	3.78	3.37	4.19	.869	3.17	2.70	3.64	.607	6.27	5.86	6.67	.660
No	14	3.68	2.89	4.47		3.72	2.98	4.46		3.38	2.56	4.21		6.43	5.72	7.13	
Primary Diagnosis[2]																	
Schizophrenia	16	3.45	2.90	4.00	.401	3.44	2.88	4.01	.555	2.84	2.19	3.50	.624	5.94	5.39	6.48	.424
Bipolar disorder	16	4.06	3.51	4.61		3.87	3.31	4.44		3.52	2.89	4.15		6.56	6.02	7.11	
MDD with psychosis	3	4.33	3.06	5.60		4.53	3.23	5.84		3.22	1.76	4.68		6.33	5.08	7.59	
Schizoaffective disorder	3	3.67	2.40	4.94		4.00	2.69	5.31		3.44	1.98	4.91		6.67	5.41	7.92	
SIPD	2	4.50	2.95	6.05		3.90	2.30	5.50		3.67	1.88	5.46		7.00	5.46	8.54	

*p < .05; ** p < .01; [1] – n = 39; [2] – ANOVA; CI – Confidence interval; MDD – Major depressive disorder; SIPD – Substance-induced psychotic disorder

Table 14. Association Between Pregnancy-related Variables and Reflective Functioning Subtypes

Demographic	*n*	Self RF	CI Lower	CI Upper	*p* value	Child RF	CI Lower	CI Upper	*p* value	Illness RF[1]	CI Lower	CI Upper	*p* value	RF Potential	CI Lower	CI Upper	*p* value
Total Sample	40	3.83	3.48	4.18		3.76	3.41	4.11		3.24	2.84	3.64		6.33	5.98	6.67	
Planned Pregnancy																	
Planned	6	4.04	2.64	5.44	.681	3.57	2.10	5.03	.715	3.17	2.04	4.29	.865	6.17	4.36	7.97	.806
Unplanned	34	3.79	3.43	4.16		3.80	3.42	4.17		3.25	2.80	3.70		6.35	6.02	6.68	
Substance Use in Pregnancy																	
Yes	21	3.89	3.36	4.43	.709	3.83	3.29	4.36	.699	3.27	2.73	3.80	.889	6.29	5.76	6.81	.810
No	19	3.76	3.28	4.25		3.69	3.19	4.19		3.21	2.57	3.85		6.37	5.88	6.86	
Psychosis During Pregnancy																	
Yes	18	3.68	3.27	4.10	.416	3.81	3.32	4.29	.818	3.04	2.58	3.50	.349	6.39	5.85	6.93	.738
No	22	3.95	3.40	4.51		3.73	3.19	4.26		3.39	2.76	4.03		6.27	5.80	6.75	

* *p* < .05; ** *p* < .01; [1] – *n* = 39; CI – Confidence interval

Table 15. Association Between Postpartum-related Variables and Reflective Functioning Subtypes

Demographic	n	Self RF	CI Lower	CI Upper	p value	Child RF	CI Lower	CI Upper	p value	Illness RF[1]	CI Lower	CI Upper	p value	RF Potential	CI Lower	CI Upper	p value
Total Sample	40	3.83	3.48	4.18		3.76	3.41	4.11		3.24	2.84	3.64		6.33	5.98	6.67	
Primary Caregiver																	
Mother	31	4.05	3.68	4.42	.033*	3.87	3.48	4.26	.285	3.43	2.98	3.89	.061	6.55	6.22	6.87	.061
Other	9	3.08	2.26	3.91		3.38	2.46	4.30		2.59	1.78	3.40		5.56	4.53	6.58	
Postpartum Psychiatric Admission																	
Yes	23	3.75	3.18	4.32	.556	3.64	3.07	4.21	.391	3.19	2.56	3.82	.736	6.13	5.60	6.66	.159
No	17	3.94	3.58	4.30		3.92	3.56	4.29		3.31	2.88	3.74		6.59	6.18	7.00	
Postpartum Separation For Longer Than One Week																	
Yes	24	3.75	3.21	4.29	.526	3.62	3.08	4.17	.285	3.17	2.56	3.77	.603	6.17	5.66	6.68	.222
No	16	3.95	3.57	4.34		3.97	3.59	4.35		3.36	2.91	3.80		6.56	6.13	7.00	
Timing of Separation[2]																	
Birth to 3 months	14	3.55	2.84	4.27	.406	3.47	2.77	4.17	.212	2.81	2.02	3.60	.310	6.00	5.31	6.69	.651
Between 3 and 6 months	5	4.45	3.26	5.64		4.51	3.34	5.68		3.93	2.61	5.25		6.60	5.45	7.75	
Between 6 and 12 months	5	3.60	2.41	4.79		3.17	2.00	4.34		3.40	2.08	4.72		6.20	5.05	7.35	

* $p < .05$; ** $p < .01$; [1] – $n = 39$; [2] – ANOVA; CI – Confidence interval

The association between length of separation and subtypes of RF was calculated by Spearman's correlation. The results of these calculations are reflected in Table 16. Negligible negative correlations were found for length of separation and variables of Self RF (rs = -.16), Child RF (rs = -.22) and Illness RF (rs = -.12). A low negative correlation was found for RF Potential and length of mother-infant separation (rs = -.32).

Table 16. Association Between Length of Separation and Reflective Functioning Subtypes (n = 24)

Variable	Self RF	Child RF	Illness RF	RF Potential
Length of Separation	-.16	-.22	-.12	-.32

* Moderate correlation (rs = +/-.50 to +/-.69); ** Strong correlation (rs = +/-.70 to +/-.89); *** Very strong correlation (rs = +/-.90 to +/- 1)

This section provided an overview of the results for RF in this sample of women with peripartum psychosis. The following section will present the results for each of the variables associated with the quality of mother-infant interaction.

Results of Parent-infant Interaction

Overall quality of interaction as reflected by the Total CIB score, ranged between 1.36 and 4.52, with a mean of 3.17 and a standard deviation of 0.64. A total of 87.50% of mothers achieved a Total CIB score of 3 and lower. On maternal composite factors, 90.00% of mothers achieved a moderate or lower score (≤ 3) for sensitivity, with 45.00% of mothers falling below the moderate range (< 3). Only 15.00% of mothers achieved a moderate or lower score for limit setting. The majority of mothers (77.50%) exhibited the presence of intrusiveness (≥ 2), while only 5.00% exhibited negative emotionality. In terms of infant factors, the majority of infants (92.50%) displayed moderate or lower social engagement, with 60.00% of infants falling below the moderate range. Withdrawal was displayed by 20.00% of infants in the sample. For dyadic factors, reciprocity fell in the moderate or lower range for 92.50% of dyads, with 70.00% of dyads displaying less than moderate reciprocity, and 32.50% displayed negative states. The distribution of scores from the Child interactive behaviour system is provided in Table 17.

Table 17. Distribution of Interaction Variables ($n = 40$, unless otherwise noted)

Category	Item	Min	*SD*	p25	Mean	p75	Max
Total CIB		1.36	0.64	2.79	3.17	3.60	4.52
Maternal Items	Sensitivity	1.09	0.71	2.74	3.07	3.50	4.21
	Intrusiveness	1.29	0.42	2.00	2.25	2.46	3.33
	Limit setting	1.00	0.82	4.17	4.47	5.00	5.00
	Negative Emotionality	1.00	0.30	1.00	1.13	1.06	2.33
Child Items	Social engagement	2.00	0.60	2.51	2.93	3.33	4.25
	Withdrawal	1.00	0.52	1.00	1.41	1.67	3.00
	Compliance*	2.33	0.48	2.83	3.24	3.67	3.83
Dyadic Items	Reciprocity	1.00	1.03	1.33	2.23	3.00	4.67
	Negative State	1.00	0.92	1.00	1.61	2.00	5.00

Minimum score = 1, maximum score = 5; * $n = 15$

The distribution of scores for the maternal variables of sensitivity, intrusiveness, limit setting and negative emotionality is illustrated in Figure 6.

Figure 6. Distribution of Maternal Interaction Variables
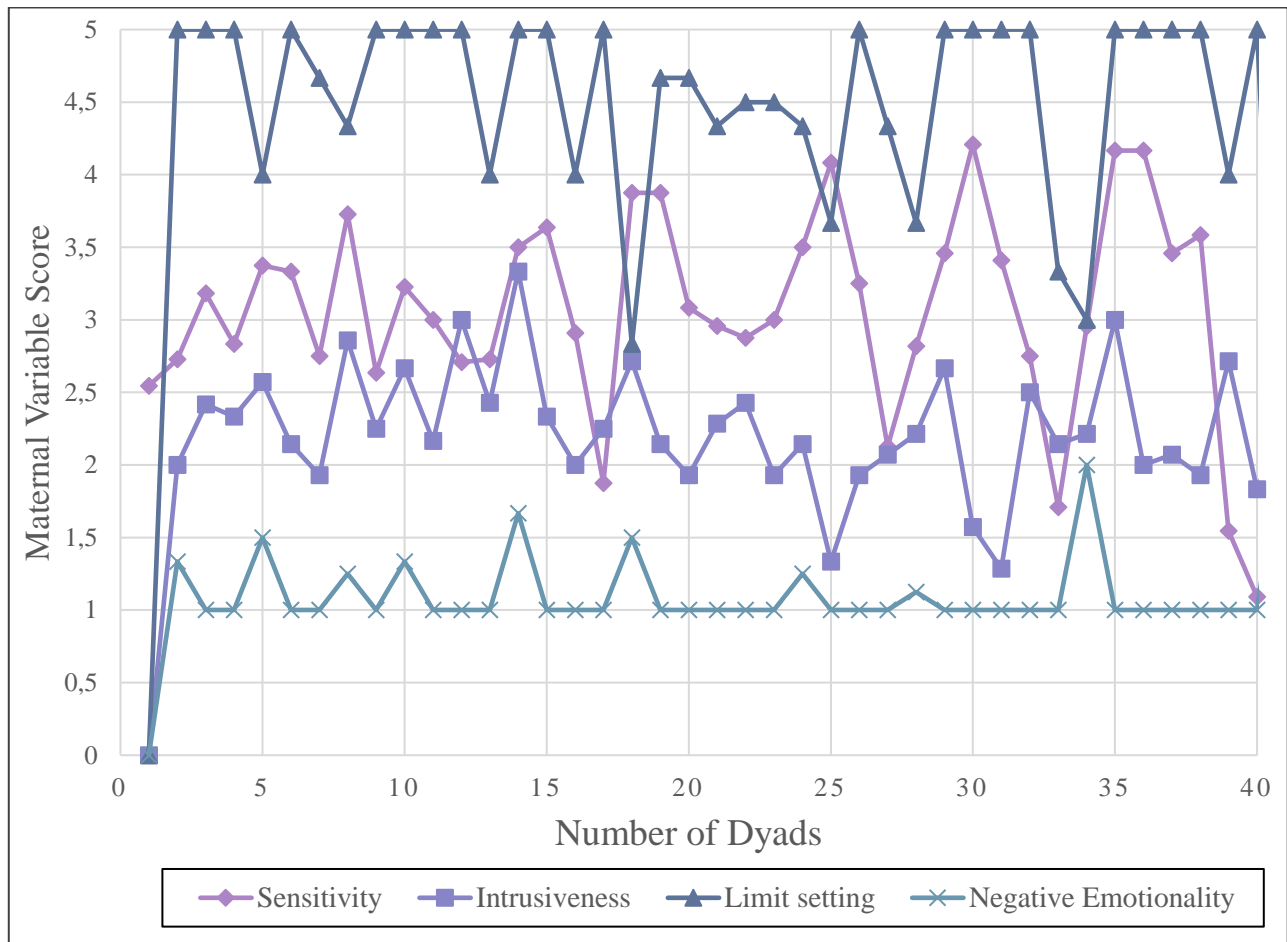
The distribution of child variables of social engagement and withdrawal is presented in Figure 7. The construct of compliance is heavily influenced by age and the majority of items making up this construct is only scored from the age of 12 months (Feldman, 1998). Due to the ages of the infants in this sample, item scores making up the construct of compliance are available for only 15 of the 40 infants. For this reason, compliance was not considered an appropriate construct for this sample of infants and was not used in the analysis of relationships between variables.

Figure 7. Distribution of Child Interaction Variables
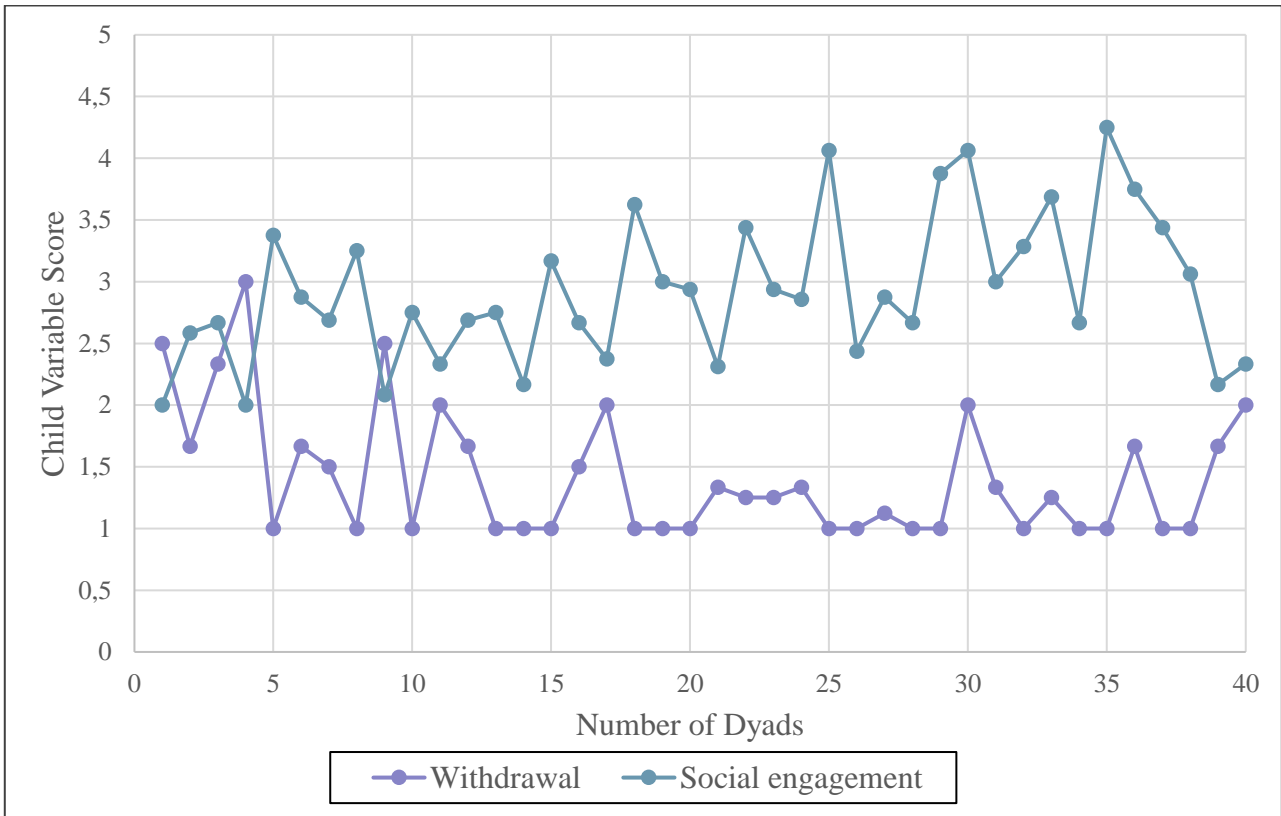
Finally, the distributions of the dyadic composites of reciprocity and negative states are reflected in Figure 8.

Figure 8. Distribution of Dyadic Interaction Variables
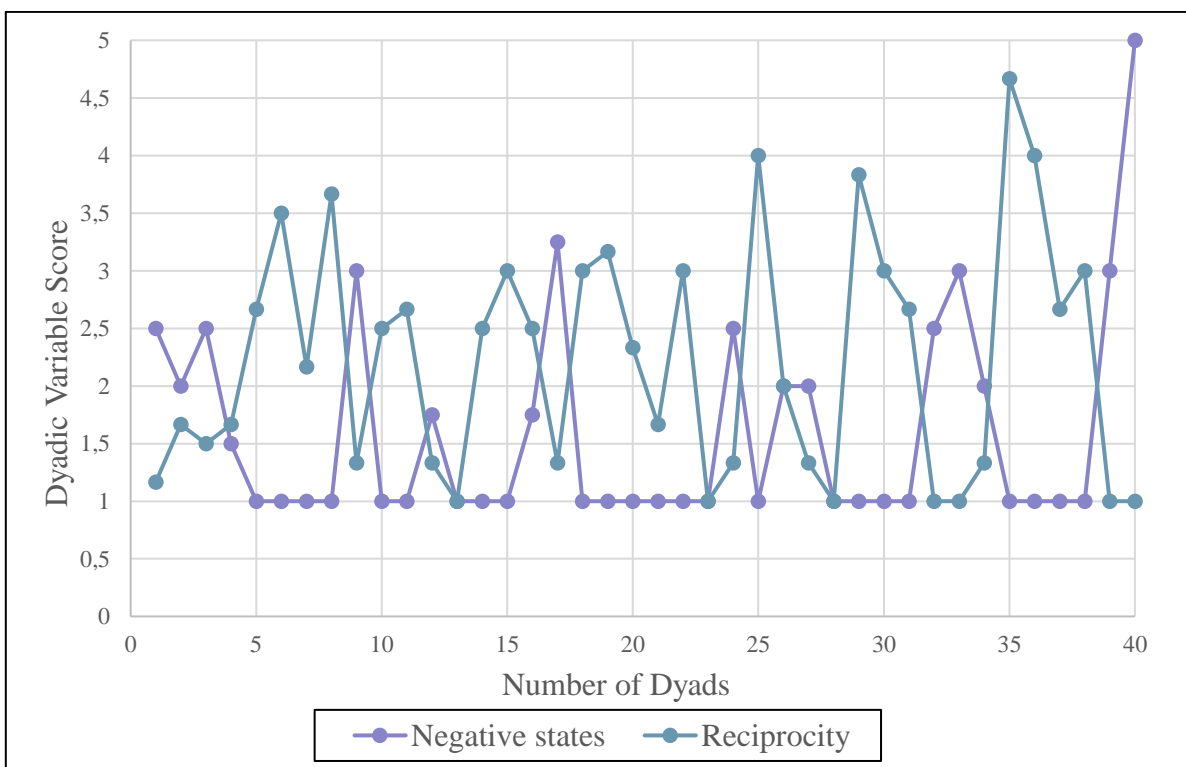
Pearson product-moment correlation coefficients were computed to assess the relationships between the Total interaction score and the composite scores. Table 18 provides the correlations among the interaction variables as measured by the CIB. Very high positive correlations were found between Total CIB score and maternal sensitivity ($r = .91$), and dyadic reciprocity ($r = .90$). Total CIB score is strongly correlated to child social engagement ($r = .70$), and has a moderate positive correlation with limit setting ($r = .68$). A moderate negative correlation was found between Total CIB score and negative emotionality ($r = -.65$) and a strong negative correlation with dyadic negative state ($r = -.77$). Total interaction score has low negative correlations with intrusiveness ($r = -.36$) and infant withdrawal ($r = -.38$).

Table 18. Correlations Among the Interaction Variables of the CIB

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Total CIB	1								
2. Sensitivity	.91***	1							
3. Intrusiveness	-.36	-.34	1						
4. Limit setting	.68*	.59*	-.03	1					
5. Negative Emotionality	-.65*	-.67*	.28	-.70**	1				
6. Social Engagement	.70**	.58*	-.48	.14	-.23	1			
7. Withdrawal	-.38	-.34	.11	-.13	.35	-.49	1		
8. Reciprocity	.90***	.78**	-.35	.41	-.47	.65*	-.31	1	
9. Negative State	-.77**	-.76**	.03	-.67*	.65*	-.41	.45	-.62*	1

* Moderate correlation ($r = +/-.50$ to $+/-.69$); ** Strong correlation ($r = +/-.70$ to $+/-.89$); *** Very strong correlation ($r = +/-.90$ to $+/- 1$)

Maternal sensitivity is strongly correlated to dyadic reciprocity ($r = .78$) and has a moderate positive correlation with maternal limit setting ($r = .59$), and child social engagement ($r = .58$). Similar to the Total CIB score, a strong negative correlation was observed between maternal sensitivity and dyadic negative state ($r = -.76$). Maternal sensitivity had a moderate negative correlation with negative emotionality ($r = -.67$). Low negative correlations were found between maternal sensitivity and intrusiveness ($r = -.34$) and infant withdrawal ($r = -.34$).

Maternal intrusiveness has low negative associations with child social engagement (r = -.48) and dyadic reciprocity (r = -.35). Intrusiveness had negligible correlations with limit setting, negative emotionality, infant withdrawal and negative state. Maternal limit setting has a strong negative correlation with negative emotionality (r = -.70) and a moderate negative correlation to dyadic negative state (r = -.67). Limit setting has a low positive correlation to dyadic reciprocity (r = -.41) and has negligible correlations to infant social involvement and withdrawal. Maternal negative emotionality has a moderate positive correlation with dyadic negative state (r = .65), a low positive correlation with infant withdrawal (r = .35) and a low negative correlation with dyadic reciprocity (r = -.47).

Child social engagement shares a moderately positive association with dyadic reciprocity (r = .65), and low negative correlations to infant withdrawal (r = -.49) and dyadic negative state (r = -.41). Child withdrawal has a low positive correlation to dyadic negative state (r = .45) and a low negative correlation to reciprocity (r = -.31). Dyadic reciprocity has a moderately negative correlation with dyadic negative state (r = -.62).

Demographic Variables and Interaction Variables

The relationships between demographic variables and the quality of interaction formed part of the supplementary examinations. The associations with Overall quality of interaction will first be presented, followed by the associations with the composites of interaction variables of maternal sensitivity, intrusiveness, limit setting, negative emotionality, child social engagement, child withdrawal, dyadic reciprocity and dyadic negative states.

Overall Quality of Interaction

Demographic Variables and Overall Quality of Interaction

The overall quality of mother-infant interaction as assessed by the CIB did not have a statistically significant relationship with the mother's age, relationship status, employment status, history of trauma or psychiatric diagnosis. Level of education was the only factor marginally associated with the overall quality of interaction, with individuals with primary level of education more likely to have

poorer quality of interaction with their infants ($p = .010$). The significance of the association between overall interaction quality and demographic details are reflected in Table 19.

Table 19. Association Between Demographic Variables and Overall Quality of Interaction

Demographic	n	Overall CIB Mean	CI Lower	CI Upper	p value
Total Sample	40	3.17	2.97	3.38	
Age of Participant					
21 to 29	17	3.20	2.85	3.54	.850
30 to 44	23	3.16	2.88	3.43	
Relationship Status					
Single	14	2.95	2.57	3.33	.116
Married or in a relationship	26	3.29	3.05	3.54	
Level of Education					
Primary	5	2.50	1.64	3.36	.010*
Secondary and Tertiary	35	3.27	3.07	3.47	
Employment Status					
Employed	11	3.27	2.90	3.64	.534
Unemployed and disability grant	29	3.14	2.88	3.39	
History of Trauma					
Yes	26	3.21	2.98	3.45	.621
No	14	3.10	2.67	3.54	
Primary Diagnosis[1]					
Schizophrenia	16	2.97	2.65	3.28	.212
Bipolar disorder	16	3.41	3.09	3.73	
MDD with psychosis	3	2.98	2.25	3.71	
Schizoaffective disorder	3	2.90	2.17	3.63	
SIPD	2	3.66	2.76	4.55	

$* p < .05$; $** p < .01$; [1] – ANOVA; CI – Confidence interval; MDD – Major depressive disorder; SIPD – Substance-induced psychotic disorder

Pregnancy Characteristics and Overall Quality of Interaction

Aspects of the pregnancy experiences of participants were examined for their association with the overall quality of interaction as measured by the CIB and is presented in Table 20. The overall quality of mother-infant interaction did not share a statistically significant relationship with factors such as having a planned or unplanned pregnancy, substance abuse during pregnancy or experiences of psychosis during pregnancy.

Table 20. Association Between Pregnancy Characteristics and Overall Quality of Interaction

Demographic	*n*	Overall CIB Mean	CI Lower	CI Upper	*p* value
Total Sample	40	3.17	2.97	3.38	
Planned Pregnancy					
Planned	6	2.72	2.01	3.43	.119
Unplanned	34	3.25	3.04	3.47	
Substance Use in Pregnancy					
Yes	21	2.99	2.71	3.28	.059
No	19	3.37	3.08	3.67	
Psychosis During Pregnancy					
Yes	18	3.17	2.85	3.50	.989
No	22	3.17	2.89	3.46	

* p < .05; ** p < .01; CI – Confidence interval

Postpartum Characteristics and Overall Quality of Interaction

Aspects of the postpartum experiences of participants were examined for their association with the overall quality of mother-infant interaction as set out in Table 21. Participants who were the primary caregivers had marginally better quality of interaction with their infants than those who were not the primary caregivers (*p* = .011). The quality of mother-infant interaction did not share a statistically significant relationship with psychiatric admission in the postpartum period, a period of separation of longer than one week between mother and infant, or in cases where there was separation, when the separation occurred.

Table 21. Association Between Postpartum Characteristics and Overall Quality of Interaction

Demographic	*n*	Overall CIB Mean	CI Lower	CI Upper	*p* value
Total Sample	40	3.17	2.97	3.38	
Primary Caregiver					
Mother	31	3.32	3.11	3.54	.011*
Other	9	2.66	2.21	3.12	
Postpartum Psychiatric Admission					
Yes	23	3.05	2.74	3.36	.148
No	17	3.34	3.08	3.59	
Postpartum Separation For Longer Than One Week					
Yes	24	3.04	2.74	3.34	.078
No	16	3.38	3.12	3.63	
Timing of Separation[1]					
Birth to 3 months	14	2.83	2.47	3.20	.088
Between 3 and 6 months	5	3.63	3.02	4.24	
Between 6 and 12 months	5	3.02	2.41	3.63	

*$p < .05$; ** $p < .01$; [1] – ANOVA; CI – Confidence interval

Table 22 reflects the relationship between the length of mother-infant separation and the overall quality of interaction as measured by the overall mean of CIB scores. There is a negligible negative correlation between overall quality of interaction and the length of separation ($rs = -.26$).

Table 22. Association Between Length of Separation and Overall Quality of Interaction ($n = 24$)

Variable	Overall CIB Mean
Length of Separation	-.26

* Moderate correlation ($rs = +/-.50$ to $+/-.69$); ** Strong correlation ($rs = +/-.70$ to $+/-.89$); *** Very strong correlation ($rs = +/-.90$ to $+/- 1$)

Maternal Interaction Scales

Demographic Variables and Maternal Interaction Scales

The participants' demographic variables and their relationships to the maternal interaction composites of maternal sensitivity, intrusiveness, limit setting and negative emotionality are presented in Table 23. Maternal sensitivity was marginally associated with level of education, with mothers with a primary level of education displaying marginally less sensitivity in interactions with their infants than mothers who had achieved higher levels of education ($p = .010$). Employed participants had marginally lower rates of intrusiveness ($p = .040$). None of the other demographic variables displayed significant associations with maternal interaction composite scores.

Pregnancy Characteristics and Maternal Interaction Scales

Factors related to the participants' pregnancy experiences, such as having a planned pregnancy, substance use in pregnancy and experiences of psychosis during pregnancy did not have statistically significant associations with maternal composite scores. The associations between pregnancy characteristics and maternal interaction composite scores are presented in Table 24.

Postpartum Characteristics and Maternal Interaction Scales

The associations between variables related to the postpartum period and maternal interaction composite scores are reflected in Table 25. Maternal sensitivity and negative emotionality did not share statistically significant associations with any of the postpartum variables. Limit setting was marginally associated with postpartum psychiatric admission, with mothers who were admitted postpartum achieving marginally lower scores for limit setting ($p = .017$). There was a statistically significant association between maternal limit setting and separation of a week or longer. Mothers who had periods of separation from their infants that lasted a week or more had significantly lower rates of limit setting in interaction with their infants ($p = .006$). Mothers who were separated from their infants between three and six months postpartum displayed marginally lower levels of intrusiveness than mothers who were separated between birth and 3 months ($p = .032$).

Table 23. Association Between Demographic Variables and Maternal Interaction Scales

Demographic	n	Sensitivity	CI Lower	CI Upper	p value	Intrusiveness	CI Lower	CI Upper	p value	Limit setting	CI Lower	CI Upper	p value	Negative emotionality	CI Lower	CI Upper	p value
Total Sample	40	3.07	2.84	3.29		2.25	2.12	2.39		4.47	4.21	4.73		1.13	1.04	1.23	
Mother's Age																	
21 to 29	17	3.05	2.69	3.40	.878	2.18	1.99	2.38	.386	4.44	4.06	4.83	.844	1.13	0.99	1.27	.965
30 to 44	23	3.08	2.76	3.40		2.30	2.11	2.50		4.49	4.11	4.88		1.13	1.00	1.27	
Relationship Status																	
Single	14	2.76	2.35	3.17	.050	2.21	2.00	2.42	.625	4.31	3.68	4.94	.444	1.15	0.94	1.35	.850
Married or in a relationship	26	3.23	2.96	3.50		2.27	2.09	2.46		4.56	4.30	4.82		1.13	1.02	1.23	
Level of Education																	
Primary	5	2.32	1.16	3.49	.010*	2.41	1.89	2.94	.363	4.00	1.85	6.15	.528	1.37	0.64	2.09	.364
Secondary and Tertiary	35	3.17	2.96	3.39		2.23	2.08	2.37		4.54	4.32	4.75		1.10	1.02	1.18	
Employment Status																	
Employed	11	3.16	2.78	3.55	.549	2.04	1.81	2.28	.040*	4.50	4.15	4.85	.864	1.09	0.97	1.20	.443
Unemployed and disability grant	29	3.03	2.74	3.32		2.33	2.17	2.49		4.46	4.11	4.81		1.15	1.02	1.28	
History of Trauma																	
Yes	26	3.11	2.84	3.37	.640	2.24	2.04	2.44	.824	4.57	4.33	4.81	.395	1.12	1.02	1.22	.728
No	14	2.99	2.53	3.46		2.27	2.12	2.41		4.29	3.63	4.94		1.15	0.94	1.37	
Primary Diagnosis[1]																	
Schizophrenia	16	2.77	2.43	3.12	.151	2.32	2.12	2.52	.093	4.27	3.84	4.70	.756	1.25	1.10	1.39	.224
Bipolar disorder	16	3.33	2.99	3.68		2.10	1.89	2.30		4.57	4.14	5.00		1.02	0.87	1.17	
MDD with psychosis	3	2.94	2.14	3.74		2.60	2.14	3.07		4.78	3.79	5.77		1.08	0.75	1.42	
Schizoaffective disorder	3	2.92	2.12	3.72		2.59	2.12	3.05		4.44	3.45	5.44		1.25	0.91	1.59	
SIPD	2	3.67	2.69	4.65		1.93	1.36	2.50		4.83	3.62	6.05		1.00	0.59	1.41	

*p < .05; ** p < .01; [1] – ANOVA; CI – Confidence interval; MDD – Major depressive disorder; SIPD – Substance-induced psychotic disorder

Table 24. Association Between Pregnancy Characteristics and Maternal Interaction Scales

Demographic	n	Sensitivity	CI Lower	CI Upper	p value	Intrusiveness	CI Lower	CI Upper	p value	Limit setting	CI Lower	CI Upper	p value	Negative emotionality	CI Lower	CI Upper	p value
Total Sample	40	3.07	2.84	3.29		2.25	2.12	2.39		4.47	4.21	4.73		1.13	1.04	1.23	
Planned Pregnancy																	
Planned	6	2.68	1.81	3.56	.255	2.37	1.76	2.99	.593	3.89	2.31	5.46	.318	1.26	0.70	1.82	.514
Unplanned	34	3.13	2.90	3.37		2.23	2.09	2.37		4.57	4.36	4.79		1.11	1.03	1.19	
Substance Use in Pregnancy																	
Yes	21	2.92	2.57	3.28	.182	2.31	2.08	2.55	.314	4.40	3.95	4.86	.592	1.18	1.03	1.33	.274
No	19	3.22	2.93	3.52		2.18	2.05	2.32		4.54	4.26	4.83		1.08	0.96	1.19	
Psychosis During Pregnancy																	
Yes	18	3.01	2.68	3.34	.650	2.36	2.13	2.58	.166	4.60	4.11	5.10	.390	1.16	0.99	1.33	.583
No	22	3.11	2.77	3.45		2.17	2.00	2.33		4.36	4.07	4.66		1.11	1.00	1.22	

*p < .05; ** p < .01; CI – Confidence interval

Table 25. Association Between Postpartum Characteristics and Maternal Interaction Scales

Demographic	n	Sensitivity	CI Lower	CI Upper	p value	Intrusiveness	CI Lower	CI Upper	p value	Limit setting	CI Lower	CI Upper	p value	Negative emotionality	CI Lower	CI Upper	p value
Total Sample	40	3.07	2.84	3.29		2.25	2.12	2.39		4.47	4.21	4.73		1.13	1.04	1.23	
Primary Caregiver																	
Mother	31	3.19	2.95	3.43	.083	2.26	2.12	2.40	.878	4.62	4.40	4.84	.146	1.08	1.00	1.16	.191
Other	9	2.64	2.02	3.25		2.23	1.80	2.65		3.94	2.99	4.90		1.31	0.95	1.66	
Postpartum Psychiatric Admission																	
Yes	23	2.94	2.59	3.29	.172	2.16	1.98	2.33	.111	4.23	3.80	4.66	.017*	1.18	1.02	1.33	.242
No	17	3.24	2.96	3.51		2.38	2.16	2.60		4.79	4.63	4.96		1.07	0.98	1.17	
Postpartum Separation For Longer Than One Week																	
Yes	24	2.93	2.60	3.26	.114	2.17	2.00	2.34	.147	4.22	3.81	4.63	.006**	1.17	1.02	1.32	.295
No	16	3.27	2.99	3.55		2.37	2.14	2.61		4.84	4.71	4.98		1.08	0.98	1.18	
Timing of Separation[1]																	
Birth to 3 months	14	2.72	2.31	3.14	.111	2.30	2.10	2.49	.032*	4.02	3.48	4.57	.492	1.26	1.06	1.45	.331
Between 3 and 6 months	5	3.58	2.88	4.27		1.77	1.44	2.10		4.60	3.68	5.52		1.00	0.68	1.32	
Between 6 and 12 months	5	2.87	2.17	3.56		2.22	1.89	2.55		4.40	3.48	5.32		1.09	0.77	1.41	

*p < .05; ** p < .01; [1] – ANOVA; CI – Confidence interval

The relationship between the length of mother-infant separation and the maternal interaction scales are reflected in Table 26. The length of separation had negligible negative correlations with the maternal composites of sensitivity (rs = -.18), intrusiveness (rs = -.03), limit setting (rs = -.21) and a negligible positive correlation with negative emotionality (rs = .19).

Table 26. Association Between Length of Separation and Maternal Interaction Scales (n = 24)

Variable	Sensitivity	Intrusiveness	Limit setting	Negative emotionality
Length of Separation	-.18	-.03	-.21	.19

* Moderate correlation (rs =+/-.50 to +/-.69); ** Strong correlation (rs =+/-.70 to +/-.89); *** Very strong correlation (rs =+/-.90 to +/- 1)

Infant Interaction Scales

Demographic Variables and Infant Interaction Scales

The relationships between participants' demographic variables and composite infant interaction scores of child social engagement and withdrawal are presented in Table 27. Level of education had a statistically significant association with infant withdrawal (p = .006) and was marginally associated with infant social engagement (p = .022). Infants of mothers with a primary level of education displayed significantly more withdrawal and marginally less social engagement than infants whose mothers had a secondary or tertiary level of education. Infant social engagement did not share statistically significant associations with any of the other maternal demographic variables. Infant withdrawal was marginally associated with the mother's primary diagnosis. Infants of mothers with a primary diagnosis of schizoaffective disorder had a marginally higher degree of withdrawal in their interaction than infants of mothers with a diagnosis of schizophrenia (p = .029).

Table 27. Association Between Demographic Variables and Infant Interaction Scales

Demographic	n	Social engagement	CI Lower	CI Upper	p value	Withdrawal	CI Lower	CI Upper	p value
Total Sample	40	2.93	2.74	3.12		1.41	1.25	1.58	
Mother's Age									
21 to 29	17	3.02	2.71	3.34	.392	1.31	1.09	1.53	.273
30 to 44	23	2.86	2.61	3.11		1.49	1.24	1.74	
Relationship Status									
Single	14	2.79	2.49	3.08	.250	1.37	1.11	1.63	.658
Married or in a relationship	26	3.00	2.75	3.26		1.44	1.21	1.67	
Level of Education									
Primary	5	2.37	2.00	2.74	.022*	2.00	1.07	2.93	.006**
Secondary and Tertiary	35	3.01	2.81	3.21		1.33	1.18	1.48	
Employment Status									
Employed	11	2.96	2.56	3.36	.857	1.43	0.97	1.89	.930
Unemployed and disability grant	29	2.92	2.69	3.15		1.41	1.23	1.58	
History of Trauma									
Yes	26	2.98	2.74	3.21	.501	1.37	1.16	1.58	.483
No	14	2.84	2.49	3.20		1.49	1.18	1.81	
Primary Diagnosis[1]									
Schizophrenia	16	0.14	2.51	3.09	.169	0.12	1.06	1.55	.029*
Bipolar disorder	16	0.14	2.87	3.46		0.12	1.17	1.65	
MDD with psychosis	3	0.33	1.97	3.32		0.27	0.86	1.97	
Schizoaffective disorder	3	0.33	1.78	3.12		0.27	1.72	2.84	
SIPD	2	0.41	2.39	4.04		0.34	0.32	1.68	

* $p < .05$; ** $p < .01$; [1] – ANOVA; CI – Confidence interval; MDD – Major depressive disorder; SIPD – Substance-induced psychotic disorder

Pregnancy Characteristics and Infant Interaction Scales

The associations between maternal pregnancy characteristics and infant interaction scales are presented in Table 28. Whether the pregnancy was planned, had a marginal association with infant social engagement, with unplanned infants displaying marginally greater social engagement (p = .044). Infants of mothers who used substances during pregnancy displayed marginally lower social engagement (p = .026). Infant withdrawal was not significantly associated with any pregnancy variables.

Table 28. Association Between Pregnancy Characteristics and Infant Interaction Scales

Demographic	n	Social engagement	CI Lower	CI Upper	p value	Withdrawal	CI Lower	CI Upper	p value
Total Sample	40	2.93	2.74	3.12		1.41	1.25	1.58	
Planned Pregnancy									
Planned	6	2.68	2.45	2.90	.044*	1.42	1.01	1.83	.985
Unplanned	34	2.97	2.75	3.19		1.41	1.22	1.60	
Substance Use in Pregnancy									
Yes	21	2.73	2.49	2.97	.026*	1.55	1.25	1.84	.086
No	19	3.15	2.86	3.44		1.27	1.14	1.40	
Psychosis During Pregnancy									
Yes	18	2.85	2.55	3.14	.433	1.46	1.18	1.74	.636
No	22	3.00	2.73	3.26		1.38	1.16	1.60	

*p < .05; ** p < .01; CI – Confidence interval

Postpartum Characteristics and Infant Interaction Scales

The associations between postpartum characteristics and infant interaction scales of social engagement and withdrawal are presented in Table 29. Infants displayed marginally greater social engagement in interaction with mothers who were identified as their primary caregiver (p = .035). Variables related to postpartum psychiatric admission and separation between mother and infant were not significantly associated with infant social engagement. No postpartum variables were significantly associated with infant withdrawal.

Table 29. Association Between Postpartum Characteristics and Infant Interaction Scales

Demographic	n	Social engagement	CI Lower	CI Upper	p value	Withdrawal	CI Lower	CI Upper	p value
Total Sample	40	2.93	2.74	3.12		1.41	1.25	1.58	
Primary Caregiver									
Mother	31	3.02	2.80	3.24	.035*	1.36	1.18	1.54	.353
Other	9	2.61	2.29	2.94		1.58	1.10	2.06	
Postpartum Psychiatric Admission									
Yes	23	2.95	2.67	3.22	.817	1.43	1.20	1.67	.787
No	17	2.90	2.61	3.19		1.39	1.13	1.65	
Postpartum Separation For Longer Than One Week									
Yes	24	2.94	2.68	3.20	.918	1.44	1.22	1.67	.670
No	16	2.92	2.61	3.22		1.37	1.09	1.65	
Timing of Separation[1]									
Birth to 3 months	14	2.79	2.45	3.13	.303	1.52	1.22	1.83	.699
Between 3 and 6 months	5	3.28	2.71	3.85		1.33	0.82	1.85	
Between 6 and 12 months	5	3.01	2.44	3.58		1.33	0.81	1.84	

*p < .05; ** p < .01; [1] – ANOVA; CI – Confidence interval

The relationship between the length of mother-infant separation and infant interaction scales are provided in Table 30. Length of separation had negligible negative correlations to the infant interaction scales of social engagement (rs = -.12) and withdrawal (rs = -.26).

Table 30. Association Between Length of Separation and Infant Interaction Scales (n = 24)

Variable	Social engagement	Withdrawal
Length of Separation	-.12	-.26

* Moderate correlation (rs = +/-.50 to +/-.69); ** Strong correlation (rs = +/-.70 to +/-.89); *** Very strong correlation (rs = +/-.90 to +/- 1)

Dyadic Interaction Scales

Demographic Variables and Dyadic Interaction Scales

The associations between maternal demographic characteristics and composite scores for dyadic interaction scales of reciprocity and negative state are shown in Table 31. The mother's level of education had a statistically significant association with the reciprocity in the interaction, with a primary level of education associated with significantly lower reciprocity ($p < .001$). The other demographic variables were not significantly associated with reciprocity. None of the maternal demographic characteristics were significantly associated with negative state.

Table 31. Association Between Demographic Variables and Dyadic Interaction Scales

Demographic	*n*	Reciprocity	CI Lower	CI Upper	*p* value	Negative state	CI Lower	CI Upper	*p* value
Total Sample	40	2.23	1.90	2.56		1.61	1.31	1.90	
Mother's Age									
21 to 29	17	2.27	1.67	2.88	.821	1.68	1.25	2.10	.675
30 to 44	23	2.20	1.79	2.60		1.55	1.13	1.98	
Relationship Status									
Single	14	1.94	1.37	2.51	.194	1.89	1.21	2.57	.218
Married or in a relationship	26	2.38	1.97	2.80		1.45	1.16	1.74	
Level of Education									
Primary	5	1.30	0.93	1.67	<.001***	2.80	1.12	4.48	.086
Secondary and Tertiary	35	2.36	2.01	2.72		1.44	1.19	1.68	
Employment Status									
Employed	11	2.45	1.81	3.10	.386	1.48	1.06	1.89	.506
Unemployed and disability grant	29	2.14	1.74	2.55		1.66	1.27	2.04	
History of Trauma									
Yes	26	2.19	1.77	2.62	.762	1.48	1.18	1.78	.312
No	14	2.30	1.71	2.89		1.84	1.16	2.52	
Primary Diagnosis[1]									
Schizophrenia	16	2.02	1.51	2.54	.285	1.92	1.46	2.38	.358
Bipolar disorder	16	2.56	2.05	3.08		1.47	1.01	1.93	
MDD with psychosis	3	1.56	0.37	2.74		1.00	-0.07	2.07	
Schizoaffective disorder	3	1.78	0.59	2.97		1.67	0.60	2.73	
SIPD	2	2.92	1.46	4.37		1.00	-0.31	2.31	

* *p* < .05; ** *p* < .01; *** *p* < .001; [1] – ANOVA; CI – Confidence interval; MDD – Major depressive disorder; SIPD – Substance-induced psychotic disorder

Pregnancy Characteristics and Dyadic Interaction Scales

The relationship between pregnancy characteristics and the dyadic interaction scales were examined and are presented in Table 32. For dyads where the pregnancy was unplanned, the reciprocity between mother and infant was found to be marginally greater (*p* = .027). Substance use during pregnancy was marginally associated with a lower rate of reciprocity (*p* = .043). Psychosis during pregnancy did not share a statistically significant association with either of the dyadic composite scales.

Table 32. Association Between Pregnancy Characteristics and Dyadic Interaction Scales

Demographic	*n*	Reciprocity	CI Lower	CI Upper	*p* value	Negative state	CI Lower	CI Upper	*p* value
Total Sample	40	2.23	1.90	2.56		1.61	1.31	1.90	
Planned Pregnancy									
Planned	6	1.64	1.09	2.19	.027*	2.25	0.70	3.80	.269
Unplanned	34	2.33	1.96	2.71		1.49	1.23	1.76	
Substance Use in Pregnancy									
Yes	21	1.91	1.52	2.30	.043*	1.87	1.38	2.36	.051
No	19	2.58	2.04	3.11		1.32	1.03	1.60	
Psychosis During Pregnancy									
Yes	18	2.23	1.72	2.74	.990	1.74	1.20	2.27	.441
No	22	2.23	1.76	2.70		1.50	1.16	1.84	

*$p < 0,05$; ** $p < .01$; CI – Confidence interval

Postpartum Characteristics and Dyadic Interaction Scales

Characteristics of the postpartum period were examined for their associations with composite dyadic interaction scales and this is presented in Table 33. The dyadic reciprocity between mother and infant shared a statistically significant association with maternal caregiver status, with reciprocity being greater for those dyads where the mother was identified as the primary caregiver ($p = .008$). Negative state did not share statistically significant associations with any of the postpartum variables examined.

Table 33. Association Between Postpartum Characteristics and Dyadic Interaction Scales

Demographic	*n*	Reciprocity	CI Lower	CI Upper	*p* value	Negative state	CI Lower	CI Upper	*p* value
Total Sample	40	2.23	1.90	2.56		1.61	1.31	1.90	
Primary Caregiver									
Mother	31	2.45	2.09	2.81	.008*	1.48	1.21	1.74	.248
Other	9	1.46	0.84	2.09		2.06	1.01	3.10	
Postpartum Psychiatric Admission									
Yes	23	2.09	1.63	2.56	.335	1.80	1.34	2.27	.085
No	17	2.41	1.91	2.91		1.34	1.05	1.63	
Postpartum Separation For Longer Than One Week									
Yes	24	2.06	1.62	2.51	.207	1.80	1.36	2.25	.066
No	16	2.48	1.96	2.99		1.31	1.01	1.62	
Timing of Separation[1]									
Birth to 3 months	14	1.80	1.26	2.33	.050	1.98	1.40	2.57	.368
Between 3 and 6 months	5	3.07	2.18	3.96		1.20	0.22	2.18	
Between 6 and 12 months	5	1.80	0.91	2.69		1.90	0.92	2.88	

* $p < .05$; ** $p < .01$; [1] – ANOVA; CI – Confidence interval

The relationship between length of mother-infant separation and dyadic interaction scales is provided in Table 34. A negligible positive correlation was found between length of separation and reciprocity (rs = .24). Length of separation has a negligible negative correlation to negative state (rs = -.09).

Table 34. Association between Length of Separation and Dyadic Interaction Scales (n = 24)

Variable	Reciprocity	Negative state
Length of Separation	.24	-.09

* Moderate correlation (rs = +/-.50 to +/-.69); ** Strong correlation (rs = +/-.70 to +/-.89); *** Very strong correlation (rs = +/-.90 to +/- 1)

This section provided an overview of the results for the variables related to the quality of mother and infant interaction. The following section provides the results for the interrelationships between the study variables.

Correlations Between Parental Reflective Functioning and Interaction Variables

Pearson correlation coefficients were calculated to assess the interrelationship between PRF variables and interaction variables as measured by the CIB. The association between the variables is provided below in Table 35. Overall CIB score shared a low positive association with overall PRF (r = .40), which was a weaker correlation than our primary hypothesis anticipated. Similarly, the overall CIB score shared low positive associations with self-focussed RF (r = .37), child-focussed RF (r = .47), illness-focussed RF (r = .35) and RF potential (r = .45). Maternal sensitivity had a moderate positive association with Child RF (r = .53) and low positive associations with overall PRF and the other RF subtypes. Maternal intrusiveness had negligible negative associations with all RF variables. Limit setting had low positive correlations to overall PRF (r = .30), self-focussed RF (r = .33), child-focussed RF (r = .38) and RF potential (r = .39). Maternal negative emotionality had low negative correlations to all RF variables. Our secondary hypothesis was accepted for the association between maternal sensitivity and child-focussed RF. The associations between maternal interaction variables and the other PRF variables were weaker than hypothesised, but appeared to be in the expected directions.

Child social engagement had low positive correlations to illness-focussed RF and RF Potential. Infant withdrawal had negligible negative correlations to all RF variables. The associations between infant interaction variables and PRF variables were weaker than hypothesised, but corresponded to the expected directions.

Dyadic reciprocity had low positive correlations to overall PRF ($r = .32$), child-focussed RF ($r = .36$), illness-focussed RF ($r = .40$), and RF potential ($r = .33$). Dyadic negative state had low negative correlations to all RF variables. The associations between dyadic interaction variables and PRF variables were weaker than our secondary hypotheses anticipated, but the direction of the associations appear consistent with our expectations.

Table 35. Correlations Between Parental Reflective Functioning and Interaction Variables

	Overall PRF	Self RF	Child RF	Illness RF	RF Potential
Total CIB	.40	.37	.47	.35	.45
Sensitivity	.46	.41	.53*	.38	.41
Intrusiveness	-.19	-.02	-.08	-.10	-.09
Limit Setting	.30	.33	.38	.04	.39
Negative Emotionality	-.45	-.38	-.45	-.31	-.46
Social Engagement	.22	.20	.24	.31	.35
Withdrawal	-.12	-.22	-.15	-.18	-.26
Reciprocity	.32	.26	.36	.40	.33
Negative State	-.34	-.38	-.44	-.34	-.47

* Moderate correlation ($r = +/-.50$ to $+/-.69$); ** Strong correlation ($r = +/-.70$ to $+/-.89$); *** Very strong correlation ($r = +/-.90$ to $+/- 1$)

Summary

This chapter provided the frequency distributions for the demographic information of the sample as well as the statistical calculations completed to determine the significance of the relationships between the study variables for PRF and quality of mother-infant interaction. In the following chapter, the results will be discussed in light of the initial study hypotheses and the existing literature.

References

Feldman, R. (1998). *Coding Interactive Behavior Manual (CIB)*. Unpublished manuscript, Bar-Ilan University.

Chapter 7: Discussion

This chapter will provide a discussion of the main findings of the study and compare these to the existing literature. Demographic information as cited in the article manuscript (Chapter 5) as well as the findings reported in the preceding Results chapter (Chapter 6) will be included. Firstly, characteristics of the sample in relation to their demographic, clinical, pregnancy and postpartum attributes will be discussed and compared to the existing literature. Thereafter, the results from the parental reflective functioning (PRF) and interaction variables will be discussed as they relate to the study hypotheses and to the body of knowledge within the field. Finally, strengths and limitations of the study will be discussed. A summary of the findings and implications for clinical practice will be presented in the subsequent chapter.

Sample Characteristics

During the peripartum period, mothers are more vulnerable to experiencing symptoms of mental illness than during other times in their life and are more likely to need admission for the treatment of the new emergence or relapse of psychiatric symptoms (Meltzer-Brody et al., 2018). The mothers in this study were selected for their experiences of psychotic symptoms during pregnancy or in the early postpartum period in order to explore the factors that contribute to their vulnerability and also to determine their level of reflective functioning and quality of interaction with their infants. Firstly, the sample size of the present study will be compared to other studies of parental reflective functioning and mother-infant interaction in samples with psychosis or severe mental illness. The following section will focus on discussing the findings of the sample characteristics according to their demographic features, pregnancy-related, and postpartum-related variables.

Sample Size

The current study comprised 40 women recruited with experiences of peri- and postpartum psychosis. Previous studies of reflective functioning using narrative techniques in populations with psychosis had smaller sample sizes, which ranged from 8 (Braehler & Schwannauer, 2012) to 34 (MacBeth et al., 2011). Observational studies of mother-infant interaction where the mothers were diagnosed with schizophrenia or another severe mental illness (SMI), had comparable sample sizes (Rigby et al., 2016; Wan et al., 2007, 2008). A summary of studies evaluating the constructs of reflective function

(RF) and mother-infant interaction in samples with psychosis or with SMI are provided in Table 36 below.

Table 36. Summary of Studies Examining Constructs of Reflective Function and/or Mother-infant Interaction in Mothers With Severe Mental Illness (SMI)

Author	Sample	Methods	Key findings
Reflective function in populations with psychosis			
MacBeth, Gumley, Shwannauer & Fisher 2011	34 individuals with first episode psychosis (FEP)	RF scores derived from Adult Attachment Interview	RF median of 3, comparable to other clinical populations. RF not compromised by psychotic symptoms.
Braehler & Schwannauer 2012	8 individuals with adolescent-onset psychosis	RF scores derived from Adult Attachment Interview and a grounded theory open interview	Majority of sample had RF scores of 1 to 3
Mother-infant interaction in mothers with SMI			
Wan, Salmon, Riordan, Appleby, Webb & Abel 2007	13 mothers with diagnosis of schizophrenia, 14 with bipolar disorder and 11 mothers with depression	Mother-infant interaction rated with the Global Ratings Scales of Mother-Infant Interaction.	Mothers with schizophrenia had poorer quality of interaction than the other two groups.
Wan, Warren, Salmon & Abel 2008	14 mothers with diagnosis of schizophrenia, 8 with bipolar disorder and 23 with depression	Maternal responsiveness and infant behaviours coded with modified version of Stanley classification system.	Mothers with schizophrenia exhibited low positive responsiveness, but were not significantly less responsive to their infants, compared to the other two groups.
Mentalising and mother-infant interaction in mothers with psychiatric diagnosis			
Rigby, Conroy, Miele-Norton, Pawlby & Happé 2016	7 mothers with schizophrenia, 4 with schizoaffective disorder, 10 with bipolar disorder and 19 with depression and anxiety	Mentalising assessed with social cognition tasks: Frith-Happé Animations, Reading the Mind in the Eyes Test and Bowler Coat Story. Mother-infant interaction assessed with Crittenden CARE-Index.	Mentalising was associated with maternal sensitivity, but did not differ significantly between diagnostic groups. Mothers with schizophrenia displayed lower sensitivity.
Suchman, Ordway, De las Heras & McMahon 2016	17 mothers attending a mental health clinic and took part in a mentalisation-based therapy	Maternal RF coded from Parent Development Interview and mother-infant interaction assessed with Coding Interactive Behaviour system.	Post-treatment RF was in the low (RF=3) range. Maternal sensitivity, child engagement and dyadic reciprocity were in the moderate (CIB score of 3) range.

Demographic Variables

Forty mother-infant dyads were recruited to the study. Mothers were interviewed at least six months postpartum and provided information regarding their socio-demographic characteristics, pregnancy and post-partum experiences. The mothers in this study reported several socio-demographic risk factors that likely contribute to their caregiving burden, which may place the dyad at risk for difficulties in the mother-infant interaction (McFadden & Tamis-Lemonda, 2013; Ramsauer & Achtergarde, 2018).

Although the majority of mothers (65.00%) were either married (30.00%) or in a relationship (35.00%), half of the sample reported a lack of partner support as a psychosocial stressor (50.00%). The presence of a supportive partner has been suggested as functioning as a buffer to the adverse effects of parenting risk factors (Kim et al., 2016; Tamis-Lemonda et al., 2004) and is associated with better mother-infant interaction quality (McFadden & Tamis-Lemonda, 2013).

The majority of mothers had a secondary level of education (70.00%), with five mothers only achieving a primary level of education (12.50%). Half of the mothers were unemployed (50.00%), less than a quarter received a disability grant (22.50%), and just over a quarter were employed (27.50%). The relatively low rate of maternal employment likely contributed to the financial hardship reported by more than a third of the sample (37.50%).

Two-thirds of mothers reported a lifetime experience of trauma (65.00%). Just less than half of mothers reported a lifetime history of abuse (45.00%), with physical abuse reported by 27.50% and sexual abuse reported by 22.50% of mothers. The majority of these mothers reported experiencing abuse prior to their pregnancy (88.89%), with just over a quarter reporting abuse in the postpartum period (27.78%). Partners were implicated as the perpetrators of abuse by 8 mothers (44.44%). However, four out of five mothers who experienced postpartum abuse, reported that this occurred at the hands of their partners (80.00%). High rates of intimate partner violence (IPV) have been reported among women in Sub-Saharan Africa (Shamu et al., 2011) and in South-Africa (Jewkes et al., 2010). IPV of South African women during pregnancy and in the postpartum period has been associated with severity of maternal depression (Tsai et al., 2016) and developmental delays in infants (Rodriguez et al., 2018). Pregnant women attending a Midwife Obstetric Unit (MOU) in Cape Town were more likely to have experienced IPV if they had a history of mental illness, were food insecure, unemployed, had experienced past abuse or were in a stable, but unmarried relationship (Field et al.,

2018). Although the rate of abuse experienced by women in the present study during pregnancy was relatively low, the rate of abuse during the postpartum period perpetrated by partners, was relatively high.

Schizophrenia (40.00%) and bipolar disorder (40.00%) were the most prevalent psychiatric diagnoses of the women in this sample, with the remainder diagnosed with major depressive disorder with psychosis (7.50%), schizoaffective disorder (7.50%) and substance-induced psychotic disorder (5.00%). Although bipolar disorder appears to be the strongest predictor of postpartum psychosis, relapses in the postpartum may also occur with psychotic symptoms in other illnesses such as schizophrenia, schizoaffective disorder and major depression (Jones et al., 2014; Matevosyan, 2011; Munk-Olsen et al., 2009). Although not as frequently observed, women with substance use disorders may also experience postpartum psychosis (Davidson et al., 2017).

Psychosocial risk factors were prevalent among this group of mothers, including a lack of partner support, high rates of unemployment, financial difficulties and high rates of reported lifetime history of trauma and abuse. The following section will address pregnancy-related factors encountered by mothers who participated in the study.

Pregnancy-related Factors

The majority of pregnancies in this study were unplanned (85.00%). This rate was greater than that found among mothers attending a MOU (68.20%) in the Western Cape, South Africa (Williams et al., 2014). The higher rate found among the present study's mothers, may be due to the presence of psychiatric conditions. High rates of unplanned pregnancy have been reported in women with schizophrenia (Matevosyan, 2011; Miller, 1997) and bipolar disorder (Marengo et al., 2015). A consumer survey in Australia among women with enduring major mental illnesses, found that 61.20% of pregnancies were unplanned (Hauck et al., 2015). Du Toit and colleagues (2018) reported that 47.20% of pregnant mothers attending local maternal mental health clinics had unplanned pregnancies. Although the studies by Du Toit (2018) and Hauck (2015) were among women with psychiatric conditions, 53.74% of Du Toit's sample had a diagnosis of major depressive disorder, with 21.96% diagnosed with bipolar disorder and 17.29% diagnosed with schizophrenia spectrum disorders. Similarly, Hauck's (2015) study included diagnoses of anxiety, personality disorders, eating disorders and depression, although the distribution of diagnostic categories were not provided. The

focus on severe mental illness in this study may account for the higher rate of unplanned pregnancy among the women in our sample. Another possible reason for the substantially higher rate of unplanned pregnancies in the present sample may be due to the sample characteristics. The present study recruited a smaller number of participants than any of the aforementioned studies.

The majority of mothers in our sample reported substance use during pregnancy (52.50%). Tobacco was the most commonly used substance (45.00%). Prenatal nicotine use is associated with adverse pregnancy outcomes and negatively impacts child health, behaviour and development (Louw, 2018). Less than a quarter of our sample reported the use of alcohol (22.50%) and even fewer reported the use of illicit substances (17.50%) during pregnancy. The rates of smoking and alcohol use reported in our sample were higher than Vythilingum and colleagues (2012) found among women presenting for antenatal visits at a MOU in Cape Town (smoking in 36.80%, and alcohol use in 20.20% of pregnant mothers). The self-reported prevalence of alcohol use was lower than the 36.90% found by Williams and colleagues (2014) among pregnant women attending MOUs in Cape Town. The relatively high rate of alcohol use is cause for concern, as it contributes to the development of fetal alcohol spectrum disorders (FASD) and other long-term negative child outcomes (Louw, 2018). Illicit substance use was reported by 17.50% of women in this study, which exceeded the rates of 4.02% and 3.57% found by Vythilingum and colleagues (2012) and Williams and colleagues (2014), respectively. The higher rates of substance use found in our study may be due to multiple demographic and risk factors found among individuals with psychosis (Gregg et al., 2007). Less than half of our sample experienced symptoms of psychosis during pregnancy (45.00%).

The psychosocial risk factors identified in this sample are similar to findings reported from the Drakenstein Child Health Study (DCHS), a longitudinal study of women and child outcomes in a peri-urban region of the Western Cape, South Africa (Donald et al., 2018; Stein et al., 2015). Psychosocial risk factors that characterise the DCHS include, high rates of psychological distress (23.00%), depression (24.00%), maternal substance use, a recent exposure to trauma (52.00%) and intimate partner violence (46.00%) (Stein et al., 2015). Additionally, low household income, limited maternal education (at least 60.90% did not complete secondary schooling), and high rates of unplanned pregnancy (65.60%) were also reported from the Drakenstein study (Donald et al., 2018). The following section will focus on the postpartum characteristics of the mother-infant dyads of this sample.

Postpartum-related Factors

The majority of mothers were identified as the primary caregiver of their infants (77.50%). A systematic review by Ramsauer and Achtergarde (2018) found that mothers with schizophrenia were more likely to lose custody of their infants than mothers with other postpartum psychoses.

More than half of the mothers in our study required a psychiatric admission in the postpartum period (57.50%), with just over half of the admissions occurring in the first three months (52.17% of total admissions, 30.00% of total sample). A meta-analysis by Wesseloo and colleagues (2016) found that 35.00% of women with bipolar disorder or previous postpartum psychosis experienced a relapse in the postpartum. The rate of psychiatric admission within the first three months postpartum in our sample corresponds to that of Taylor and colleagues (2019) who examined the rates of relapse of women with schizophrenia and bipolar disorder, and found a rate of 28.32% in the first three months postpartum.

More than half of mothers experienced early separation from their infants (60.00%), defined as a period of separation of a week or longer within the first year postpartum. Periods of separation during infancy are particularly concerning as infants rely on their mother's physical proximity as the primary indicator of her availability, which is necessary for the development of a secure mother-infant attachment (Howard et al., 2011). The rate of early separation was higher than the 27.19% of mothers with psychotic disorders who were separated from their infants following joint admission to mother-baby units (MBUs), reported by Cès and colleagues (2018). Risk factors for early separation identified by Cès and colleagues (2018) included a maternal history of institutionalization during childhood, single status, an early hospitalization of the infant and maternal psychiatric decompensation during pregnancy. During the joint admissions reported by Cès and colleagues (2018), mother-infant interaction could be observed: 4.43% of mothers displayed abusive behaviour, while more than half displayed neglect (51.74%). During pregnancy, 55.99% of women in their study experienced decompensation, a somewhat higher rate than the 45.00% of mothers in this study who experienced psychotic symptoms during pregnancy. All the separations in our study were temporary, as mothers who were not residing with their infants were not included in the study. This may account for the difference in rates of separation found in our study, compared to that of Cès and colleagues (2018).

High rates of postpartum psychiatric admission and early separation between mothers and infants were found in this sample. Despite these separations, the majority of mothers were identified as the primary caregiver at the time of their study visit. The following section will report the results from the quantitative measures employed in the study, namely the parental reflective functioning and quality of mother-infant interaction found in the present sample.

Results of Quantitative Measures

Parental Reflective Functioning (PRF)

One of the central aims of this study was to determine the parental reflective function (PRF) of mothers who experienced peri- or postpartum psychosis. Our primary hypothesis was that the participants in this study would display lower than ordinary (Overall RF of 5) PRF. Participants' overall PRF functioning ranged widely, from 1 (absent RF) to 6 (between ordinary and marked RF), with a mean of 4.10 and a median of 4. The results appeared to confirm our hypothesis, as 65.00% of the participants ($n = 26$) had an overall PRF score of 4 or lower. However, the remainder (35.00%) achieved an overall PRF score of 5 or above, which is classified as ordinary reflective functioning (RF). The latter indicates that overall PRF does not appear to be impaired in all mothers with peripartum psychosis.

Our secondary hypothesis for this research aim was that mothers will also display scores lower than 5 for the RF subtypes. Potential RF also had a wide range, from 3 (questionable or low RF) to 8 (between marked and exceptional RF), with a median of 7 and a mean of 6.33. The median score of 7 indicates that mothers in this sample have the potential for marked RF, which is characterised by sophisticated, complex or elaborate consideration of mental states as they relate to themselves or others. The finding that all but one of the mothers displayed scores of 5 or greater for potential RF contradicts our secondary hypothesis and indicates the potential of these mothers to develop at least an ordinary level of reflective functioning.

The means for self-focussed RF and child-focussed RF were very similar (means of 3.83 and 3.71 respectively), indicating that mothers displayed similar reflectiveness in relation to themselves as with their infants. The finding that the majority of mothers achieved scores lower than 5 for self-focussed and child-focussed RF appear to confirm our secondary hypothesis. Illness-focussed RF

ranged between 1 (absent RF) and 6.33 (between ordinary and marked RF), indicating that mothers' ability to reflect on the impact of their illness on themselves and their infants varied a great deal. The mean illness-focussed RF of 3.24 indicates that mothers generally had a low capacity for reflectiveness in relation to their illness. The majority of mothers achieved scores lower than 5 for illness-focussed RF, which appears to confirm the study's secondary hypothesis.

Correlations Between Reflective Functioning Variables

Overall PRF was strongly correlated with all other indices of RF, which indicates that mothers' overall parental reflective capacity closely resembled their capacity for self-reflectiveness ($r = .82$), child-reflectiveness ($r = .74$), illness reflectiveness ($r = .72$), as well as their potential for reflectiveness ($r = .76$). Moderate positive correlations between self-focussed, child-focussed, illness-focussed and potential RF also indicate that mothers displayed similar capacity for reflectiveness across the areas of RF measured in this study.

Comparison of Reflective Functioning Findings to Existing Literature

The overall RF median for our sample (4) was one scale point higher than the median RF of 3, found by MacBeth et al. (2011) in a sample with first episode psychosis. Although the study by Braehler and Schwannauer (2012) did not quote RF scores specifically in their adolescent group with psychosis, the majority of their sample were classified as having lacking or low RF, which corresponds to scores of 3 and below. The use of different assessment measures may explain the finding that our sample's overall RF is greater than what was found in previous studies that focussed on populations with psychosis. Both previous studies employed the Reflective function coding framework to derive RF scores from the Adult Attachment Interview (Fonagy et al., 1998; George et al., 1996), whereas our study employed the PDI, which was developed specifically for coding PRF (Aber et al., 1985; Slade, Bernbach, et al., 2005). The use of the PDI includes specific prompts to elicit reflective content, which may account for the greater RF found in the present sample.

Suchman and colleagues (2016) employed the Mothering from the Inside Out intervention with mothers enrolled in mental health services and found a mean pre-treatment PRF of 2.85 and a posttreatment PRF of 3.11, both of which were also lower than the overall PRF mean found in our study. Both the present study and that of Suchman and colleagues (2016) employed the PDI as assessment measure for RF. The sample size of Suchman et al.'s (2016) study was only 17 participants, which may have contributed to the difference in scores. Although both studies focussed

on mothers with psychiatric illnesses, the mothers enrolled in mental health services had predominantly common mental disorders, such as anxiety and depressive disorders.

Compared to a study of RF among mothers in the Western Cape, the present sample's overall PRF was higher than their pre-intervention mean PRF of 2.67 and more closely resembled the postintervention mean PRF of 3.92 (Suchman et al., 2020). Both studies employed the PDI to assess maternal RF, but the pilot intervention study by Suchman et al. (2020) had a smaller sample size of 13 and their diverse sample included mothers with substance use disorders, mothers of burn victims, mothers enrolled in kangaroo mother care (KMC), mothers of children with intellectual disability, as well as 8 mothers with mental illness. The difference in sample characteristics may account for the difference in overall PRF found.

The mean potential RF in the present study (6.33) was two scale points greater than that found by Suchman and colleagues (2016) (pre-treatment = 4.12 and posttreatment = 4.53) and in the South African pilot study by Suchman and colleagues (2020) (pre-treatment = 4.17 and posttreatment = 4.75). The higher potential RF score found in the present sample may indicate that mothers with peripartum experiences of psychosis have the potential for substantial reflectiveness when their mental illness is stable. This corresponds to Muzik et al's (2015) assertion that mothers whose psychiatric symptoms are under control display an increased capacity to attend to their children's emotions and needs and are more able to self-reflect. Overall RF scores tend to be lower than potential RF scores, which may be related to the potentially limiting impact of difficult emotional content on reflective capacity.

The relatively high potential RF score found in this sample of mothers is somewhat contrary to the findings by Sprong and colleagues (2007) that mothers with schizophrenia had stable mentalising impairment, even when in remission. Although our sample included mothers with schizophrenia, it also included mothers with bipolar disorder, major depressive disorder, substance-induced psychotic disorder and schizoaffective disorder, which may have contributed to the high potential RF scores. However, none of the RF indices were significantly associated with maternal psychiatric diagnoses, indicating that maternal RF was not more impaired in mothers with a diagnosis of schizophrenia than the other psychiatric diagnoses included in this study. Considering the wide range of overall PRF and potential for RF found in this sample, with a substantial proportion (35.00%) displaying at least

ordinary PRF, our findings appear to support the assertion by Braehler and Schwannauer (2012) that mentalising deficits are not present in all psychiatric patients.

Self-focussed RF (mean of 3.83) and child-focussed RF (mean of 3.75) most closely resembled the post-intervention scores found by Suchman et al.'s (2016) study of mental health users (self-focussed = 2.85 and child-focussed = 3.42) as well as that of the Western Cape pilot study (Suchman et al., 2020) (self-focussed = 3.52 and child-focussed = 3.59). Despite differences found between the three studies on Overall RF and Potential RF, mothers in the present study exhibited similar capacities for reflectiveness in relation to themselves and their infants, without intervention. This may indicate that the mothers in the present sample's reflectiveness could improve in the context of targeted interventions aimed at improving their parental reflectiveness, such as the Mothering from the Inside Out intervention (Suchman et al., 2020).

In summary, two-thirds of the mothers exhibited a lower than ordinary level of PRF, which corresponded to the study's first primary hypothesis. Overall PRF was not impaired in all mothers, with a third exhibiting at least an ordinary level of reflectiveness. Mothers displayed low reflectiveness in relation to themselves, their infant and their illness, but exhibited the potential for complex PRF. Our secondary hypothesis was supported by the lower than ordinary level of self-focussed, child-focussed and illness-focussed RF in the sample. However, mothers displayed greater than ordinary potential for RF, which contradicted our secondary hypothesis for RF potential.

Quality of Mother-infant Interaction

The study's second aim was to examine the quality of maternal-infant interaction of mother-infant dyads when mothers experienced peri- or postpartum psychosis. We hypothesised that dyads in which the mother experienced peripartum psychosis will experience moderate or poorer quality of mother-infant interaction, as indicated by a Total CIB score of 3 or lower. The overall quality of mother-infant interaction found in this sample as reflected by the Total CIB score ranged between 1.36 and 4.52, with a mean of 3.17, which indicates a moderate quality of interaction. Only five dyads (12.50%) achieved a total interaction score of 4 or more, indicating that the majority of dyads (87.50%) had a moderate or lower degree of interaction quality. This finding appears to lend support to our primary hypothesis related to the study's second aim.

Our secondary hypothesis predicted that mothers with peripartum psychosis will demonstrate moderate or lower maternal sensitivity, limit setting, child social engagement and dyadic reciprocity, as indicated by scores of 3 or lower. We also hypothesised that mothers would demonstrate the presence of maternal intrusiveness, negative emotionality, infant withdrawal and dyadic negative state, as indicated by scores of 2 or greater for these constructs.

This sample of mothers demonstrated a moderate degree of sensitivity in interaction with their infants (mean = 3.07). The majority of mothers (90.00%) achieved moderate or lower scores for sensitivity, which appears to lend support to our secondary hypothesis. Although the mothers in our sample demonstrated a relatively low level of intrusiveness (mean = 2.25), the majority of mothers (77.50%) demonstrated scores of 2 or greater for the construct intrusiveness. This finding corresponded to our secondary hypothesis that mothers with peripartum psychosis will demonstrate the presence of intrusiveness.

The mothers in the present study displayed a large degree of limit setting (mean = 4.47), which comprises codes for maternal behaviour of consistency, appropriate structure and maintaining focus on a mutual activity. The finding that 85.00% of mothers demonstrated a greater than moderate degree of limit setting was contrary to our secondary hypothesis. The ethnotheory of parenting describes interdependent cultures as promoting relatedness as a socialisation goal of parenting (Keller et al., 2006). Yovsi and colleagues (2009) describe the concept of responsive control as a parenting strategy that is characterised by emotional involvement and physical closeness with the aim of instructing, training and directing the infant's activities . It may be possible that the mothers in this sample ascribe to a similar ethnotheory of parenting in relation to their infants.

There was an absence of maternal negative emotionality (mean = 1.13), which consists of coding for maternal expressions of negative affect, hostility, anxiety and criticism. Only 5.00% of mothers achieved scores of two or greater for negative emotionality, which appears contrary to our secondary hypothesis that mothers will demonstrate the presence of negative emotionality as evidenced by scores of two or greater.

Infants in this sample demonstrated a moderate or lower degree of engagement in the interaction (mean = 2.93), with 92.50% of infants attaining scores of 3 or lower on social engagement. This

finding lends support to our secondary hypothesis. There was a relative absence of infant withdrawal (mean = 1.41), with only 8 infants (20.00%) achieving a score of two or greater on this construct. This finding was contrary to our expectation that infants will display the presence of withdrawal.

There was a relatively low level of synchrony in the interaction, as indicated by the composite of dyadic reciprocity (mean = 2.23). A total of 92.50% of dyads achieved moderate or lower scores for reciprocity, with 70.00% falling below a score of 3. This finding appears to support our secondary hypothesis. The dyads' interaction exhibited a relative absence of negative state (mean = 1.61), which encompasses codes for constriction and tension within the interaction. A total of 32.50% of dyads demonstrated the presence of negative state, which was contrary to our secondary hypothesis.

Correlations Between Interaction Variables

The overall quality of interaction was very strongly correlated with maternal sensitivity ($r = .92$) as well as the dyadic factor of reciprocity ($r = .93$). This finding appears to correspond to the theoretical underpinnings of attachment theory, in so much as maternal sensitivity to infant cues will allow for greater quality of interaction, which corresponds to the degree of synchrony (reciprocity) between mother and infant (Marvin & Britner, 2008). Maternal limit setting shares a moderate positive correlation with overall quality of interaction ($r = .68$), suggesting that when mothers are able to provide appropriate consistency and structure in interaction with their infants (limit setting), this contributes to greater quality of interaction. The construct of negative emotionality consists of codes for maternal expressions of negative affect, hostility, anxiety and criticism. It is therefore not surprising that negative emotionality shares a moderate negative association with overall interaction quality ($r = -.65$), suggesting an unfavourable association between maternal negative affective expressions and interaction quality, even in the absence of negative actions. The strong positive association between child social engagement and overall quality of interaction ($r = .70$) may demonstrate that infants are more likely to display active engagement in interactions where the overall quality of the dyads' interaction is greater. The strong negative association between dyadic negative state and overall interaction quality ($r = -.77$) may reflect the negative relationship between constriction and tension with the overall quality of mother-infant interaction. Overall quality of interaction and maternal sensitivity share low negative correlations with maternal intrusiveness and infant withdrawal. This may suggest that when mothers display intrusive behaviour and infants tend to withdraw, both factors have a small but negative contribution to the quality of interaction and the mothers' ability to be sensitive in the way they interact.

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The strong positive correlation between maternal sensitivity and dyadic reciprocity ($r = .78$) demonstrates that interactions are more likely to be reciprocal or synchronous between mother and infant, when mothers are able to display greater sensitivity. The moderate positive association between maternal sensitivity and limit setting ($r = .59$) may point to the theoretical notion that mothers who are able to accurately interpret and respond to their infants' cues are better able to provide a consistent and appropriate structure while interacting with their infants (Leerkes & Zhou, 2018). The moderate negative association of maternal sensitivity with maternal negative emotionality ($r = -.67$) may indicate that sensitive mothers are less likely to display negative affective expressions. Similarly, the strong negative association of maternal sensitivity with dyadic negative state ($r = -.76$) may indicate that mothers who display more sensitivity have interactions with their infants that tend to be less constricted in emotional expressiveness, exploration and tension. There was a moderate positive association between maternal sensitivity and infant social engagement ($r = .58$), possibly suggesting that mothers who display more sensitive responsiveness provide a more favourable environment for their infants who are then able to interact more spontaneously.

A low negative association was found between maternal intrusiveness and infant social engagement ($r = -.48$), which appears to lend support to attachment theory's assertion that intrusive maternal behaviour is likely to generate infant attachment deactivation strategies (Belsky & Fearon, 2008). A negative association between maternal intrusiveness and infant engagement was also reported by Dib and colleagues (2019) in mothers with chronic anxiety. Similarly, a low negative association was found between maternal intrusiveness and dyadic reciprocity ($r = -.35$), suggesting that mothers' insensitive or forceful actions have a negative relationship with the synchrony of the dyad's interaction.

A strong negative correlation between maternal limit setting and maternal negative emotionality ($r = -.70$), and a moderate negative correlation with dyadic negative state ($r = -.67$) were found. It may be hypothesised that when a mother is able to provide appropriate structure and consistency, there is a lower tendency for maternal anxiety and negative affective expressions as well as less uncertainty for the dyad in the interaction, which may lead to lower tension and restrictiveness in the dyad's expressions and enthusiasm. Maternal limit setting had a low positive correlation with reciprocity ($r = .41$), which suggests that maternal appropriate structure and consistency has a positive, albeit low, relationship with the synchrony of the dyad's interaction.

Maternal negative emotionality had a moderate positive association with dyadic negative state (r = .65), possibly reflecting the contribution of maternal expressions of negative affect to the tension and restriction experienced in the interaction. A low negative association was found between maternal negative emotionality and dyadic reciprocity (r = -.47), possibly reflecting the contribution of the expression of negative maternal affect to decrease synchrony and fluency in the dyad's interaction. Maternal negative emotionality had a low positive association with infant withdrawal (r = .35), suggesting that maternal expressions of negative affect and hostility may contribute to infant withdrawal to some degree.

Infant social engagement has a moderate positive association with dyadic reciprocity (r = .65), indicating the positive contribution that social behaviours of the infant, such as vocalisation, initiation and positive affect makes to the synchrony and fluency of the mother-infant interaction. There was a low negative association between infant social engagement and withdrawal (r = -.49). This suggests that infants who display positive affect, vocalise spontaneously, and are affectionate to their mothers tended to display less withdrawal and avoidance in the interactions.

Infant withdrawal shared a low negative association with dyadic reciprocity (r = -.31). This may suggest that infants who exhibit withdrawal behaviours may contribute to a decrease in fluency and synchrony in the interaction. An alternative explanation may be that in dyads where there is less synchrony, some infants may become more withdrawn and avoidant. There was a low positive correlation between infant withdrawal and dyadic negative state (r = .45). Interactions characterised by constriction and tension may contribute to infant withdrawal to some degree.

There was a moderate negative association between the dyadic factors of reciprocity and negative state (r = -.62), indicating that greater restriction and tension in the mother-infant interaction may impede the dyad's fluency, adaptation and synchrony within their interaction.

Comparison of Mother-infant Interaction Findings to Existing Literature

The Coding Interactive Behaviour system (CIB) has been utilised in two South African samples, a pilot intervention study by Suchman and colleagues (2020), as well as in a group of substance-using mothers (Adams, 2020). Compared to Suchman's (2020) intervention study, the present sample's scores most closely resembled the pre-intervention total CIB score (3.17 compared to 3.10) and scores

for maternal sensitivity (3.07 compared to 2.98), child social engagement (2.93 compared to 3.02) and dyadic reciprocity (2.23 compared to 2.45). These similarities may indicate that the dyads in our study have similar rates of overall quality of interaction, maternal sensitivity, infant engagement and dyadic reciprocity as a diverse sample of mothers in the Western Cape who benefitted from a mentalisation-based intervention. The current study's scores were similar to the intervention study's post-intervention scores for maternal negative emotionality (1.13 compared to 1.14) and dyadic negative state (1.61 compared to 1.62) (Suchman et al., 2020). This study's mothers who experienced peripartum psychosis appeared to display relatively fewer expressions of negative affect, and the interaction was characterised by less tension than that of Suchman et al.'s (2020) sample prior to intervention.

Adams'(2020) recent study of substance-abusing mothers compared the caregiving behaviours of 19 trauma-exposed mothers to 53 mothers without trauma exposure. The present study's sample exhibited similar scores for maternal sensitivity (3.07 compared to 3.16 for trauma-exposed and 2.97 for non-exposed), and negative emotionality (1.13 compared to 1.11 for trauma-exposed and 1.20 for non-exposed). Compared to Adams' (2020) study, dyads in the present sample had poorer overall quality of interaction (3.17 compared to 3.58 for trauma-exposed and 3.41 for non-exposed), mothers exhibited greater intrusiveness (2.25 compared to 1.83 for trauma-exposed and 1.94 for non-exposed), and their infants displayed poorer social engagement (2.93 compared to 3.59 for trauma-exposed and 3.41 for non-exposed), and greater withdrawal (1.41 compared to 1.05 for trauma-exposed and 1.21 for non-exposed). The dyads in our sample displayed poorer reciprocity (2.23 compared to 3.31 for trauma-exposed and 3.12 for non-exposed) and greater negative state (1.61 compared to 1.07 for trauma-exposed and 1.33 for non-exposed). Poorer overall quality of interaction, poorer maternal sensitivity, and greater intrusiveness have been reported in mother-child interactions of mothers with psychotic disorders (Hipwell & Kumar, 1996; Riordan et al., 1999; Steadman et al., 2007; Wan et al., 2008). Similarly, infants of mothers with postpartum psychosis are more likely to display poorer engagement and more withdrawal than the offspring of mothers without psychotic disorders (Ramsauer & Achtergarde, 2018). It is thus not surprising that the dyads in the present displayed poorer quality of interaction than mothers with substance use.

In comparison to findings of Suchman and colleagues (2016) who implemented a mentalising intervention with 17 mental health users, a similar trend was observed. When compared to pre-intervention scores, mothers in our sample displayed less sensitivity (3.07 compared to 3.39), infants displayed poorer engagement (2.93 compared to 3.28) and the dyads exhibited less reciprocity (2.23

compared to 3.28). Although the present sample and Suchman's (2016) sample were both mental health users, the latter's sample consisted mainly of anxiety (52.94%) or mood disorders (47.06%). The fact that our study focussed specifically on mothers with peripartum psychosis may account for the differences in findings.

In summary, this sample of mothers with peripartum psychosis had a moderate or lower overall quality of interaction with their infants and displayed a moderate or lower degree of sensitivity and exhibited the presence of intrusiveness. Their infants displayed a moderate or lower degree of engagement, with a relative absence of withdrawal. The dyad exhibited a lower than moderate degree of reciprocity and a relative absence of negative states. These findings appear to support our primary hypothesis that dyads in which the mother experienced peripartum psychosis will display moderate to poor quality of mother-infant interaction. Our secondary hypothesis was supported for the constructs of maternal sensitivity, intrusiveness, infant social engagement, and dyadic engagement. The findings were contrary to our secondary hypothesis for the constructs of maternal limit setting, negative emotionality, infant withdrawal and dyadic negative state. The following section will expand on the relationships between study variables and the sample's demographic, pregnancy and postpartum characteristics.

Results of Study Variables

The study variables of PRF and mother-infant interaction were compared with the demographic details, pregnancy and postpartum characteristics of the sample. The supplementary examination of associations between the variables will be discussed in the following section.

Parental Reflective Functioning (PRF)

Parental Reflective Functioning and Demographic Details

Mothers' age was not associated with her overall PRF nor with any of the RF subtypes. This corresponds to earlier findings from the London Parent-Child study (Fonagy et al., 1998), but differs from Sleed et al.'s (2018) validation study of the PDI in which older maternal age of the total sample was significantly related to higher overall RF. The present study's sample size was substantially smaller than that of Sleed's (2018) validation study ($n = 341$) and our mothers ranged in age from 21

to 44 years, with mothers in the study by Sleed et al. ranging between 18 and 55 years. The larger sample size and greater age range in the validation study may account for the divergence in findings.

Mothers' relationship status was significantly associated with PRF. A single parent status has a statistically significant association with lower child RF (p = .008), illness RF (p = .006), and RF potential (p = .007), and a marginal association with lower overall PRF (p = .045), and self RF (p = .019). This finding corresponds to that of Sleed et al. (2018), and highlights the importance of having a supportive partner in the transition to parenthood. Although Smaling et al. (2015) did not find a significant association between single parenthood and RF, the size of social support networks in their sample strongly predicted prenatal RF. One may hypothesise that the presence of a partner provides a supportive function, whether in physical, emotional or financial support and this may reduce the level of stress experienced by mothers. Parenting stress can be defined as the difficulty or distress that arises from the demands associated with parenting (Anthony et al., 2005) and can refer to a lack of social support experienced in one's role as a parent. Mothers who experience a better co-parental alliance with their partners have been shown to experience less parental stress (Shai et al., 2017). This reduction in parental stress and perhaps the addition of physical support in providing care to young infants, may provide the mother with more time and space to mentalise.

Mothers with a primary level of education had marginally lower levels of overall PRF (p = .020), and RF potential (p = .010), which corresponds to previous findings (Sleed et al., 2018; Smaling et al., 2015). Suchman and colleagues (2010) found that maternal education was not significantly associated with self RF or child RF. In addition to education, Sleed and colleagues (2018) also examined the effect of nonverbal IQ on RF and found that nonverbal IQ was a stronger predictor of RF. They noted that RF requires a capacity for abstract reasoning and that the PDI also requires an understanding of the questions and an ability to provide meaningful responses. Although IQ was not specifically assessed in the present sample, it is possible that discontinuing schooling in the primary phase precluded the development of greater abstract reasoning, which may have negatively influenced parental reflective capacity.

Overall PRF did not have a statistically significant association with employment status. This finding corresponds to the non-significant association between employment and prenatal RF found by Smaling et al. (2015) , but appears contrary to findings by Sleed et al., (2018) who found a significant association between long-term unemployment and RF. In our study, only RF potential was marginally

associated with employment, with mothers who were employed displaying marginally greater RF potential (p = .021). Sleed et al. (2018) suggested that employment requires effective social skills. This may explain the relationship between RF potential and employment found in our study.

A maternal history of trauma was also not significantly associated with any of the PRF variables, which corresponds to findings by Stacks et al. (2014) and Ensink et al. (2016). Contrary to our findings, a recent study by Moser et al. (2019) found that mothers with a history of physical maltreatment had significantly lower RF than those without. It may be possible that the seemingly contradictory findings may relate to different definitions of trauma and abuse found in the abovementioned studies.

PRF variables were not significantly associated with the primary psychiatric diagnosis of mothers. Although RF has been shown to be impaired in various mental illnesses (Katznelson, 2014), our findings do not indicate that different diagnoses impact parental reflective functioning in discernible ways. Our study did not examine the types of mentalising impairments present in the interviews, which may have clarified the presence or absence of mentalising differences between disorders.

Parental Reflective Functioning and Pregnancy Variables

Overall PRF and the various subtypes of RF were not significantly associated with planning of pregnancy, the use of substances in pregnancy or with maternal experiences of psychosis during pregnancy. Smaling and colleagues (2015) found a strong negative association between prenatal substance use and maternal prenatal RF. The authors suggested that substance-abusing mothers may experience a lesser degree of maternal preoccupation, which may contribute to poorer prenatal RF. The lack of association between PRF and substance use in pregnancy in our sample may be explained by a smaller sample size than that of Smaling and colleagues (2015). Our results appear to indicate that factors related to the present sample's pregnancy did not significantly affect the mother's PRF in the postpartum.

Reflective Functioning and Postpartum Variables

Overall PRF, child-focussed RF, illness-focussed RF and RF potential did not differ significantly between mothers who were the primary caregiver of their infant and those who were not. However, self-focussed RF was marginally greater for mothers who were identified as the primary caregiver of

their infant (p = .033). Self-focussed RF consists of questions related to the mothers' experience and resolution of difficult emotions. It could be hypothesised that mothers who were the main caregiver of their infants needed to develop greater self-regulation strategies in order to manage their own emotions, while tending to the needs of their infants.

Similarly, postpartum psychiatric admission of the mother and postpartum separation between mother and infant were not significantly associated with any of the PRF variables. It could be hypothesised that the physical separation between mothers and infants did not significantly affect the mothers' ability to develop mental representations of their infants. PRF variables were not significantly associated with the length of separation between mother and infant. RF potential shared a low negative correlation with the length of mother-infant separation (rs = -.32), while overall PRF and the other RF subtypes shared negligible negative correlations with the length of separation. In other words, the longer the mother was separated from her infant, the lower the degree of RF potential she exhibited. The majority of separations occurred as a result of psychiatric admissions. Mothers who were separated from their infants for longer periods may not have developed the ability to hold their infants in their minds in the same way as those mothers who were separated for shorter periods from their infants. This may be due to the painful nature of emotions associated with separation, or with the practical reality of not being in their infants' presence. These factors may have contributed to the negative association between RF potential and length of separation.

The absence of significant associations of overall PRF with maternal experiences during and after pregnancy could indicate that factors associated with demographic risk exerted a greater influence on PRF than experiences specific to the pregnancy and postpartum periods. This may relate to findings by Sadler and colleagues (2013) that mothers with demographic risk factors (including low levels of education and trauma) may have a tendency to use language in more functional and concrete ways, rather than communicating complex emotional and cognitive experiences.

This section focussed on understanding the relationships of PRF variables with demographic details, pregnancy and postpartum variables. Maternal demographic characteristics such as the mother's relationships status, level of education, employment and whether she was the primary caregiver of her infant, were associated with aspects of PRF. The following section will focus on the relationships between mother-infant interaction, demographic details, pregnancy and postpartum variables.

Mother-infant Interaction

Mother-infant Interaction and Demographic Variables

The overall quality of mother-infant interaction, maternal, infant and dyadic variables as assessed by the CIB were not significantly related to maternal age or maternal relationship status. Mothers who were married or in a relationship did not display a significantly greater level of sensitivity in their interactions with their infants than single mothers. The lack of an association between maternal relationship status and maternal sensitivity appears to be contrary to findings by Neuhauser (2018) that social support is particularly important for the expression of maternal sensitivity in at-risk mothers.

A secondary or higher level of maternal education shared a statistically significant association with lower infant withdrawal (p = .006), and greater dyadic reciprocity (p < .001) and a marginal association with greater overall quality of mother-infant interaction (p = .010), greater maternal sensitivity (p = .010), and greater infant social engagement (p = .022). These findings appear to correspond with Thun-Hohenstein's (2008) findings that maternal education has a significant effect on overall parental competence. The association between maternal educational attainment and sensitivity has been demonstrated in cross-cultural studies (Richman et al., 1992), and studies of at-risk families (Ensink et al., 2016; Neuhauser, 2018; Ribeiro-Accioly et al., 2018; Tamis-LeMonda et al., 2009; Zelkowitz et al., 2009). Similarly, infant engagement has also been found to be associated with maternal level of education (Gondwe et al., 2017). Neuhauser (2018) contended that parents who have higher levels of education are likely to have greater cognitive and social resources, allowing them to be more sensitive in their interactions. The combination of interaction variables that are significantly associated with maternal education appears consistent with attachment theory, in that infants of mothers who are able to respond more sensitively are more likely to engage actively and less likely to display withdrawal (George & Solomon, 2008). It may be possible that both maternal sensitivity and infant social engagement contributed to the significant relationship between maternal level of education and dyadic reciprocity.

Mothers who were unemployed or receiving a disability grant displayed marginally more intrusiveness in their play interaction with their infants (p = .040). Previous studies of maternal interactions have found associations between maternal employment and sensitivity (Buehler & O'Brien, 2011), which was not observed in our sample. Few studies have specifically reported on the relationship between maternal employment and intrusiveness in mother-infant interactions. Wille

(1992) found that factors associated with mothers' return to work, such as the satisfaction with their return to work, impacted their behaviour towards their infants. Mothers who were less satisfied in their working role, were observed to find separations from their infants more difficult, displayed less autonomy and behave in more directive ways (Wille, 1992). Similarly, Stifter and colleagues (1993) reported that employed mothers who had greater separation anxiety displayed greater intrusiveness in interaction with their infants. Our sample was not evaluated for their satisfaction in return to employment or degree of separation anxiety they experience. In the present sample of mothers, it may be possible that unemployed mothers experience greater financial hardship or other psychosocial stress. These experiences may contribute to a tendency to experience frustration, which could manifest as negative affect, hostility and criticism in interaction with their infants. A possible alternative hypothesis is that the ability of a mother to maintain employment, despite having a severe mental illness, is a reflection of the ability to maintain effective social skills, such as identifying and appropriately responding to social cues. Individuals who recover from episodes of psychosis often experience difficulties in securing employment (Rinaldi et al., 2010). It could be hypothesised that employed mothers in this sample may be better able to recognise infant cues and respond less forcefully to their infants within play interactions.

The mother's previous experience of trauma was not significantly associated with overall interaction quality, maternal, infant or dyadic factors. This finding corresponds to that of Adams (2020), who found that mother-infant interaction variables as measured on the CIB did not differ significantly between substance-using mothers with trauma exposures and those who were not exposed to trauma.

The mother's primary diagnosis had a marginally significant association with infant withdrawal (p = .029). Infants of mothers who have a diagnosis of schizoaffective disorder were more likely to display signs of withdrawal than infants of mothers with a diagnosis of schizophrenia. It may be hypothesised that mothers with a schizoaffective disorder may experience both mood and psychotic symptoms, which may lead the infant to experience their mother as ambivalent or unpredictable in her behaviour. Such unpredictable maternal behaviour, described by Lyons-Ruth and Jacobvitz (2008) as both frightening and frightened, is associated with disorganized attachment. This behaviour is likely to alarm the infant, precipitating withdrawal. The infant is presented with a paradoxical situation in which the infant wants to turn to the caregiver for comfort, but the caregiver is also the source of the alarm (Granqvist et al., 2017).Withdrawal in these infants are coded for signalling a discomfort with the interaction by displaying avoidance, negative affect, emotional lability or withdrawal. Although maternal sensitivity or intrusiveness are maternal factors that may contribute

to infant withdrawal, neither of these two factors were significantly associated with the mothers' primary diagnosis.

Composite factors for maternal limit setting, negative emotionality and dyadic negative state were not significantly associated with any maternal demographic variables.

Mother-infant Interaction and Pregnancy-related Variables

Overall quality of mother-infant interaction and maternal composite scores for sensitivity, intrusiveness, limit setting and negative emotionality were not significantly associated with any of the pregnancy-related variables.

Planning of pregnancy was marginally related to infant social engagement ($p = .044$) and dyadic reciprocity ($p = .027$). Somewhat surprisingly, infant social engagement was marginally better when parents did not plan for their pregnancy. Similarly, dyadic reciprocity was marginally greater when the pregnancy was unplanned. This finding is contrary to that of a cross-cultural study by Roe and Drivas (1993), who found that infants who were from planned pregnancy displayed greater vocal interaction, excitement and reciprocity in relation to their mothers, but not when interacting with a stranger. In a study of Brazilian mothers, unplanned pregnancy was associated with less sensitive parenting (Ribeiro-Accioly et al., 2018). In a qualitative study about the psychosocial causes of maternal depression in Australia, Eastwood and colleagues (2015) found that cultural beliefs towards unplanned pregnancy held by the community in which the mother lived, determined the level of social support she received. Some mothers were unsupported by family members through negative attitudes towards unplanned pregnancy, other unplanned pregnancies were experienced very positively. Although unplanned, it may be possible that the pregnancies in this group of mothers were not unwanted and that the mothers did not experience negative attitudes from their support network. In an exploration of the barriers to the use of modern contraceptives in rural areas of the Democratic Republic of Congo, Muanda and colleagues (2017) highlight the importance of cultural beliefs in understanding the planning of pregnancy. The authors described the belief shared by many African cultures that children are 'a gift from God' and that larger families are desirable. It may be possible that some of the mothers in our sample share these beliefs, which may contribute to the association between unplanned pregnancy and greater dyadic reciprocity.

Substance use during pregnancy was marginally associated with infant social engagement (p = .026). Infants of mothers who used substances during pregnancy displayed less social engagement than infants of mothers who did not use substances during pregnancy. This finding corresponds to findings by Siqveland and Moe (2014), who found that infants of mothers who used substances displayed less positive affective expressions than infants of mothers without substance use. A systematic review of studies focussing on the quality of caregiving in mothers using illicit substances also revealed decreased responsiveness in infants of substance-using mothers (Hatzis et al., 2017). The difference found in our study between the two groups of infants may be associated with the detrimental impact of prenatal exposure to substances on the infant's neurodevelopmental trajectory (Ross et al., 2015) and behaviour (Lester et al., 2002; Shankaran et al., 2007).

Maternal substance use in pregnancy was marginally associated with decreased dyadic reciprocity (p = .043). Interactions of dyads where the mothers used substances during pregnancy were less reciprocal. Our findings correspond to that of Siqveland and colleagues (2014) who also found poorer quality of mother-infant interaction and less mutuality in their sample of mothers with substance abuse. In addition to the influence of infant-related factors as noted above, maternal substance abuse has been associated with decreased emotional engagement in mothers (Borelli et al., 2012) and decreased child engagement (Rasmussen et al., 2016), both of which may have contributed to the differences in the dyadic reciprocity in the present sample.

Maternal sensitivity was not significantly associated with prenatal substance use, which is contrary to the results of a systematic review by Hatzis and colleagues (2017). In the present study, patterns of prenatal substance use as well as quantities of substance usage across pregnancy was not objectively assessed and relied on self-report from the participants. It may be possible that some mothers did not acknowledge substance use during their pregnancy.

Maternal experiences of psychosis during pregnancy was not significantly associated with any of the interaction variables. In fact, there was almost no difference in overall interaction quality (p = .989) and reciprocity (p = .990) for the variable of psychosis during pregnancy. This finding was surprising, but may indicate that the experience of psychotic symptoms during pregnancy did not share a significant relationship with postpartum interaction quality.

Mother-infant Interaction and Postpartum Variables

When mothers were identified as the primary caregiver of their infants, the dyad's reciprocity was rated significantly higher (*p* = .008) and their overall quality of interaction was marginally greater (*p* = .011), and their infants displayed marginally more social engagement (*p* = .035). The process of caregiving provides the opportunity for a parent to become familiar with their infant, which results in improved quality of interaction (Chung et al., 2018). Mothers in our study who are primarily responsible for providing care to their infants are likely to spend more time together than those who are not the primary caregivers. The associations between caregiver status of the mothers in our study, dyadic reciprocity and overall quality of caregiving may be explained by the greater familiarity brought on by the act of caregiving. Infant social engagement may equally increase through the process of familiarity that active caregiving provides, which may explain our findings.

Maternal limit setting was significantly greater when there were no postpartum separations of a week or more (*p* = .006) and marginally greater when there was no postpartum psychiatric admission (*p* = .017). These groups overlapped greatly: mothers who had at least one separation from their infants (*n* = 24) differed by only one participant from the group of mothers who had psychiatric admissions (*n* = 23). Limit setting comprises codes for maternal behaviours that are consistent, provides appropriate structure and maintains the infant's focus on a mutual activity. Mothers who were not separated from their infants may feel more able to provide suitable limits due to having spent more time with their infants. As the majority of mothers who experienced a separation were admitted due to the need for psychiatric treatment, their lower scores for limit setting may also reflect the possible influence of psychiatric symptoms on their ability to maintain appropriate structure and consistency in relation to their infants. A previous study of early mother-infant separation did not find differences in maternal behaviour when separations occurred, but reported differences in child behaviour at age three (Howard et al., 2011). However, maternal behaviour – specifically sensitivity, warmth or detachment – was assessed when their children were aged three, and limit setting was not specifically assessed. The possible influence of early separation on the infant may only be observed at a later stage of child development. The absence of significant differences in infant behaviour may point to the quality of received substitute care that infants who were separated from their mothers received (Bowlby, 1980).

Considering the timing of separation, when separations took place between three and six months postpartum, mothers were marginally less intrusive in their interactions with their infants (*p* = .032).

Compared to mothers who were separated from their infants during the first three months postpartum, mothers who remained with their infants during that period may have developed greater accuracy in recognising their infants' cues and behavioural signals through spending more time caring for the infant and through daily handling (Bowlby, 1982). These mothers may have had the opportunity to recognise the need for more infant-led interactions and be less forcing or overriding in their interactions. Early separation has been associated with increased maternal intrusiveness in a systematic review of studies on preterm infants (Korja et al., 2012), which corresponds to our finding.

The length of separation between mother and infant showed negligible associations with overall interaction quality (rs = -.26), maternal interaction variables (sensitivity: rs = -.18; intrusiveness: rs = -.03; limit setting: rs = -.21; negative emotionality: rs = .19), infant variables (social engagement: rs = -.12; withdrawal: rs = -.26), and dyadic variables (reciprocity: rs = .24; negative state rs = -.09). Although our expectation was that the length of early separation would be negatively associated with mother-infant interaction quality, this was not supported by our findings.

Similar to the results for PRF, interaction variables shared associations with demographic risk factors of maternal education level and employment status. In addition, the mother's primary diagnosis, as well as pregnancy variables of substance use in pregnancy and planning of pregnancy were associated with variables related to the quality of interaction between mother and infant. Postpartum characteristics of maternal non-caregiver status, postpartum admission and separation were related to poorer mother-infant interaction. The following section will focus on the interrelationships between PRF and quality of mother-infant interaction.

Correlations Between Parental Reflective Functioning and Mother-infant Interaction Variables

Our third research aim's primary hypothesis was that overall PRF will have a moderate positive correlation with overall quality of the mother-infant interaction as reflected in the total CIB score. We found that overall PRF shared a low positive association with the overall quality of mother-infant interaction (r = .40). Although the strength of the correlation between overall PRF and overall quality of interaction was lower than anticipated, the direction of the association appears to correspond to our expectations and with the theoretical underpinnings of attachment theory. Our secondary hypothesis predicted that there will be moderate positive correlations between PRF and maternal sensitivity and

limit setting, infant social engagement and dyadic reciprocity. We also hypothesised that there will be moderate negative correlations between PRF and maternal intrusiveness, negative emotionality, infant withdrawal and dyadic negative state. There was a moderate positive correlation found between maternal sensitivity and child RF ($r = .53$), which lent support to our secondary hypothesis. A mothers' ability to reflect on her infant's internal experience may mirror the mother's tendency to be attuned to her infant's signals, one of the features of maternal sensitivity (Bretherton, 2013), which may account for this finding.

Overall PRF shared low positive associations with maternal sensitivity ($r = .46$), limit setting ($r = .30$), and dyadic reciprocity ($r = .32$). These findings do not appear to support our secondary hypotheses in relation to the predicted strength of the correlation between PRF and interaction constructs, but the direction of the associations appear consistent with our expectations. Parental reflective capacity has been associated with the development of infant attachment security and the provision of a secure base (Slade, Grienenberger, et al., 2005). The association between PRF and limit setting may be understood from this perspective as the mother's ability to provide appropriate structure and security to her infant. Similarly, maternal reflective capacity has been implicated as having a buffering effect on the disruption of affect regulation during times when infants display distress (Grienenberger et al., 2005). Greater parental reflectiveness may enhance the dyadic nature of the interaction through the mother's ability to adapt to the infant's signals and promote affect regulation. The negligible positive correlation between PRF and infant social engagement ($r = .22$) failed to lend support to our secondary hypothesis.

Overall PRF had low negative associations with maternal negative emotionality ($r = -.45$), and dyadic negative state ($r = -.34$). Again, the strength of these correlations was weaker than our secondary hypothesis predicted, but the direction appeared consistent with our expectations. The ability to mentalise is thought to underlie one's ability to regulate affective experiences through the ability to think about internalised representations of one's emotional states (Fonagy et al., 2007). Our finding that mothers who had greater expressions of negative affect displayed lower levels of PRF, appears to lend support to this notion. When mothers in our study were less able to mentalise effectively, the dyad's interaction was more tense and limited in exploration and enthusiasm. The negligible negative correlations between PRF and maternal intrusiveness ($r = -.19$) and infant withdrawal ($r = -.12$) did not lend support to our secondary hypothesis.

The majority of interaction variables shared similar strengths and directions of associations with most of the PRF subtypes. This may relate to the high degree of correlation between PRF factors.

In summary, PRF had a low positive association with the quality of mother-infant interaction, maternal sensitivity, limit setting and dyadic reciprocity. The associations between variables were weaker than we hypothesised, but the direction of associations appeared to be consistent with our expectations and to the framework of attachment theory.

Strengths and Limitations

This study is, to our knowledge, the first South African study to provide a descriptive exploration of the pregnancy experiences of women who specifically had psychotic symptoms during pregnancy, or in the postpartum period. It is also the first to examine the PRF of women with severe mental illness. Although there have been several studies examining the quality of mother and infant interaction among women with severe mental illness in international literature, this is to our knowledge the first to provide such a description in the South African context. The findings in this study contribute to the body of knowledge related to South African women's experiences of pregnancy and the postpartum period as well as examining their PRF and the quality of interaction with their infants.

Several areas of limitation were identified during the course the study. In terms of study design, the cross-sectional nature of the study does not lend itself to determine causality of the findings. In addition, the cost of the assessment procedures prohibited the inclusion of a control group. Therefore, future studies of this population of women could compare the PRF and interaction quality of mothers with peripartum psychosis to mothers with severe mental illness, but who did not experience psychosis, to determine the specific impact of psychosis on these variables. Alternatively, a longitudinal study design with repeated assessments may clarify the long-term impact of peripartum psychosis on maternal RF and the quality of interaction with their infants.

Peripartum psychosis is not a unitary construct. It includes experiences of psychosis during pregnancy and in the postpartum period. This can be seen in the distribution of primary diagnoses found in this sample. The phenomenon of postpartum psychosis is not recognised as a separate disorder in the *International Statistical Classification of Diseases and Related Health Problems* (11th ed.; *ICD-11*;

World Health Organization, 2020) or in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association, 2013).

Mothers who were not living with their infants were excluded from the sample. This may have biased the study sample in favour of mothers who displayed less of a risk to their infants or mothers who were more motivated to maintain contact with their infants. In the absence of repeated follow-up with the participant dyads, the longitudinal outcomes for both mother and infant are not known.

Information gathered for pregnancy planning, complications during pregnancy and delivery, experiences of trauma and abuse, and substance abuse during pregnancy, relied on participant self-reports. The use of objective measures to assess for the presence of adverse life events, such as the Life Events Checklist for DSM-5 (LEC-5) and obstetric records to provide clinical information on pregnancy and delivery experiences may have improved the reliability of this information.

Rates of postpartum depression among South African women in the Western Cape has been reported to affect about a third of women (Choi et al., 2017; Cooper et al., 1999). Maternal depression has been associated with negative parenting behaviour and infant withdrawal (Apter-Levi et al., 2016). Although the majority of women in this study had a primary diagnosis of schizophrenia or bipolar disorder, their current experience of depressive symptoms was not specifically assessed.

Infant temperament may influence maternal caregiving behaviour and perceptions of parenting stress (Mäntymaa, Puura, Luoma, Salmelin, & Tamminen, 2006; Sheinkopf et al., 2006; Siqveland, Olafsen, & Moe, 2013). Future studies may also assess infant temperament by means of objective assessment or parental self-report to examine the association between temperament and the quality of mother-infant interaction and maternal reflective function.

Infant attachment classifications were not examined in this study. Very few assessments of infant attachment classifications have been conducted on the African continent (Voges et al., 2019). In addition, very little is known about the infant attachment classifications of mothers with severe mental illness within the South African population. This information would have provided additional information about the infant's mental health in the present study.

The presence of social risk factors such as unemployment, lower levels of education, previous experiences of trauma, poverty, substance use, and environmental adversity have been associated with impaired RF (Moser et al., 2019; Sadler et al., 2013; Sleed et al., 2018; Stacks et al., 2014) and impairments in mother-infant interaction (Neuhauser, 2018; Tamis-LeMonda et al., 2009; Thun-Hohenstein et al., 2008). It is possible that the presence of socio-demographic risk factors may have had a negative impact on the PRF and interaction quality of mothers and dyads in the present sample. In order to differentiate the effect of peripartum psychosis from the impact of social risk factors on PRF and the quality of mother-infant interaction, future studies could stratify dyads according to their degree of risk.

The inclusion of three mothers with intellectual disability may have reduced the overall mean RF. Sleed and colleagues (2018) caution that lower than average non-verbal IQ may confound RF, which may have occurred in our sample. Despite their low scores on overall RF (scores ranged between 2 and 3), these three mothers' RF Potential ranged between 5 and 7, indicating that they exhibited the capacity for ordinary to marked reflectiveness.

Finally, there are limitations to the statistical approach employed in the study. The number of two-sample t-tests conducted may increase the risk for Type I errors in the erroneous reporting of positive findings. Further, the sample size poses a risk for Type II errors due to the limited statistical power of the study. As a result of the small sample size, more complex statistical calculations could not be conducted. In a larger sample, multivariate statistical methods could be applied to test explanatory models. Similarly, the use of clustering methods to identify subgroups within the sample of mothers with peripartum psychosis may have been possible if a larger sample was used.

Summary

This chapter presented the demographic, pregnancy and postpartum characteristics of the sample of 40 mothers with peripartum psychosis who participated in this study. Thereafter, the results of the study variables and their associations were discussed as they relate to our primary and secondary hypotheses and the current literature. Finally, the strengths and limitations of the study were provided. The following chapter will provide a summary of the results and suggested implications for clinical practice.

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Chapter 8: Conclusion

The preceding chapter provided a discussion of the results found in this exploratory, descriptive study of parental reflective function (PRF) and quality of mother-infant interaction in a sample of mothers who experienced peri- and postpartum psychosis. This chapter will summarise the main findings of the study and provide suggestions for clinical practice.

Study Objectives

This study set out to explore the central research question "How do experiences of psychosis in the peri- or postpartum affect parental reflective function (PRF) and quality of mother-infant interaction?". The aims of the study were to: (i) examine the PRF, (ii) examine the quality of mother-infant interaction, and (iii) to determine if there is an association between PRF and quality of parent-infant interaction with regard to maternal, infant and dyadic factors among this group of mothers who experienced peri- and postpartum psychosis.

Our sample consisted of 40 mothers who experienced symptoms of psychosis during their pregnancy or in the first six months postpartum. The mothers completed a demographic questionnaire, an interview to elicit PRF, as well as an unstructured play interaction with their infants. Each of the study variables and their interrelationships were examined and will be summarised in the following section.

Summary of Findings

Demographic and Clinical Results

Psychosocial risk factors were prevalent in this group of mothers who experienced peripartum psychosis. These included a lack of partner support, limited education, high rates of unemployment, financial difficulties as well as a prevalence of trauma and abuse. In addition to social risk factors, our sample also presented with pregnancy-related factors that may have a detrimental impact on their experience of parenthood and the wellbeing of their infants. These included a high rate of unplanned pregnancy and substance use during their pregnancy. In the postpartum, the majority of mothers had

a psychiatric admission, which necessitated early separation from their infants. Despite these separations, the majority of mothers were identified as the primary caregivers of their infants.

Results for Parental Reflective Functioning (PRF)

We examined the PRF of these mothers and hypothesised that peripartum psychosis will be associated with lower than ordinary rates of overall PRF. Our results confirmed this hypothesis and found that the majority of mothers had a lower than ordinary overall capacity for RF. However, about a third of our sample exhibited an ordinary or above level of PRF, suggesting that the capacity for RF is not impaired in all mothers with peripartum psychosis. In addition, we predicted that mothers would exhibit lower than ordinary rates of PRF on four RF subtypes. Contrary to our expectation, our sample of mothers exhibited the potential for marked or complex RF, suggesting that their reflective capacity may improve with targeted interventions aimed at improving PRF. Corresponding to our secondary hypothesis, the mothers displayed a low ability to reflect on their own mental states, that of their infants, and on the impact of their illness on their parenting. Mothers with primary psychotic, mood or substance-related diagnoses had similar reflective capacity, indicating that this ability was not impaired by a specific diagnosis.

Results for Quality of Mother-infant Interaction

The quality of mother-infant interaction was assessed, and we hypothesised that mothers with peripartum psychosis and their infants would have a moderate or lower overall quality of interaction. Our results confirmed this primary hypothesis and found that the overall quality of interaction was moderate or lower in the majority of these mother-infant dyads where mothers experienced peripartum psychosis. Our examination of the interaction quality included factors related to maternal, infant and dyadic functioning and our secondary hypothesis predicted moderate or lower quality of interaction for constructs of maternal sensitivity, limit setting, infant social engagement, and reciprocity and predicted the presence of the constructs maternal intrusiveness, negative emotionality, infant withdrawal and dyadic negative state. Mothers displayed a moderate to lower degree of sensitivity, the presence of intrusiveness, their infants displayed a moderate and lower degree of social engagement, and the dyad exhibited less than moderate reciprocity, which corresponded to our expectations. However, mothers displayed a greater than moderate degree of limit setting, which indicated a better than expected performance on this construct. There was a relative absence of maternal negative emotionality, infant withdrawal, and dyadic negative state, which were contrary to

our expectations and indicate a better than expected performance for these variables. The relationships between interaction variables appear consistent with the theoretical constructs of attachment theory and maternal sensitivity.

Parental Reflective Functioning and Associations with Demographic, Pregnancy and Postpartum Variables

The mothers' relationship status and level of education were related to the degree of PRF she exhibited. PRF was not associated with factors such as maternal age, past experiences of trauma, or her primary diagnosis. There were also no statistically significant associations between PRF and the pregnancy-related variables of planning of pregnancy, substance use in pregnancy, or experiences of psychosis during the pregnancy. The mother's caregiver status was associated with her level of self-reflective functioning and her employment status was associated with her potential for RF. Postpartum factors such as postpartum psychiatric admission or early separation were not significantly associated with PRF. The length of separation between mother and infant did not appear to be associated with the mother's overall PRF, or her self-focussed, child-focussed, and illness-focussed reflective ability. Our findings suggest that demographic risk factors of relationship status, education level and employment as well as the mother's caregiver status, exert a greater influence on PRF than experiences specific to the pregnancy and postpartum period.

Quality of Mother-infant Interaction and Associations with Demographic, Pregnancy and Postpartum Variables

The overall quality of mother-infant interaction was associated with the mother's level of education and whether she was her infant's primary caregiver. Qualities of maternal behaviour in the interaction were influenced by the mother's level of education, employment status, the presence of postpartum admission and separation, as well as the timing of separation periods. Infant interaction factors were associated with the mother's level of education, her primary diagnosis, the planning of pregnancy, substance use in pregnancy, and the mother's caregiver status. The dyadic interaction factors were associated with maternal education, the planning of pregnancy, substance use in pregnancy, and maternal caregiver status. The presence of psychosis during pregnancy did not appear to affect the postpartum interaction quality. Our findings suggest that socio-demographic risk factors, as well as factors related to the pregnancy and postpartum experiences of mothers with peripartum psychosis, influence the quality of their interaction with their infants.

Correlations Between Parental Reflective Functioning and Interaction Variables

The study's third aim was to evaluate the association between PRF and the overall quality of mother-infant interaction in this sample of women with peri- and postpartum psychosis. We hypothesised that there will be a moderate positive correlation between PRF as indicated by the overall PRF score and the overall quality of mother-infant interaction, derived from the total CIB score. There was a low positive correlation between PRF and the overall quality of mother-infant interaction. We also predicted moderate correlations between PRF and aspects of mother-infant interaction. The variables shared a weaker than hypothesised association, but the direction of associations appeared consistent with our expectations and to the framework of attachment theory.

Implications for Clinical Practice

In combination, the risk factors described in the study highlight the challenges facing this group of women who, as a consequence of their psychiatric illness, may experience difficulties in fulfilling their parental role. The following section will provide suggestions regarding the management of modifiable risk factors, which could mitigate the combined impact of a severe mental illness and social risk factors on parental functioning and infant outcomes.

Glover and Barlow (2014) advocate for intervention during pregnancy to support the psychological wellbeing of at-risk pregnant women in order to improve the outcomes for mothers and infants. An integrated care strategy for mothers during pregnancy and in the early postpartum period could include psycho-social interventions that may promote healthy mother-infant bonding. The training of lay counsellors, community health workers and primary care nurses to detect early signs of psychiatric symptoms would assist in identifying mothers who require further intervention (Glover & Barlow, 2014). Interventions may be in the form of home visits, peer-support, referral to parent-infant clinics for outpatient support, parenting support groups, or mother-infant psychotherapy. Given the frequency with which a lack of partner support was reported as a stressor, an intervention to facilitate partner participation in the parenting role may also be beneficial to these dyads.

There exists a significant need for integrated maternal mental health services in South Africa (Meintjes et al., 2010). One such initiative from the Western Cape, the Perinatal Mental Health Project (PMHP), have reported beneficial outcomes in screening for mental health difficulties and providing counselling using a stepped-care approach (Honikman et al., 2012; Vythilingum et al., 2013).

Interventions during early infancy in order to promote mother-infant interaction and bonding may be especially important for later infant outcomes. Improvements in quality of mother-infant interaction after 6 months of age have not consistently led to improvement in the cognitive or emotional outcomes of children whose mothers have a severe mental illness. (Hipwell et al., 2000). It may therefore be worthwhile to offer early intervention in order to improve infant developmental outcomes.

A recent study evaluating the brain activation to infant stimuli of new mothers with stable schizophrenia compared to healthy control mothers, found no significant differences in the neural responsiveness between the two groups of mothers (Abel et al., 2018). The two groups also did not differ on observed maternal sensitivity. These findings suggested that differences in maternal sensitivity of mothers with schizophrenia, compared to healthy mothers were not due to differences in neural responsiveness (Abel et al., 2018). The authors suggested that differences in maternal sensitivity may be reversible when mothers are psychiatrically stable. A similar comparative study of the neural responsiveness may clarify whether there are differences in brain activation between mothers with peripartum psychosis and healthy controls.

A review of mother-child interventions for mothers with mental illnesses found that interventions that focus on the mother-child dyad were most likely to improve maternal sensitivity and child attachment, compared to mother-only interventions (Wan et al., 2008). The authors reported the absence of intervention studies that focus specifically on mothers with psychosis who are expected to experience different needs, compared to mothers with other mental health difficulties (Wan et al., 2008). Mother-infant psychotherapy has been shown to be effective in improving maternal sensitivity and infant attachment security (Guedeney et al., 2014), but often mothers with psychosis are excluded from this type of intervention (Barlow et al., 2015). Mothering from the Inside Out (MIO), is a mentalisation-based therapy that has had promising results for improving the PRF of mothers utilising mental health services (Suchman et al., 2016). The intervention has also been piloted with amongst others, mothers with severe mental illness in the Western Cape, South Africa with positive results (Suchman et al., 2020). Mothers with peripartum psychosis may benefit from being offered this intervention to improve their PRF and the quality of their interaction with their infants.

Besides focussing on the mother-infant relationship, mothers may need support to recover from postpartum psychosis. A recent systematic review of mothers' experience of postpartum psychosis highlighted the non-linear course of recovery and the importance of considering the wider social

context when offering an intervention (Forde et al., 2020). The authors conceptualised a model of recovery consisting of four themes from a metasynthesis of 15 studies. These included: (1) Experiences of shock, fear and helplessness, which include difficulties with caring for and bonding with their infant, (2) Experiences of loss and disruption to the mother's sense of self, as well as feelings of guilt and powerlessness, (3) Recovery involved making sense of and integrating the experience, adjusting to a new sense of self, and (4) Considering the social context, which includes family relationships, healthcare professionals and society's expectations (Forde et al., 2020). Mothers who have experienced peripartum psychosis may benefit from being offered individual psychotherapy or counselling to assist them in their process of recovery.

A substantial number of mothers in the study experienced postpartum relapse, with a need for psychiatric admission. This may indicate the need for more frequent psychiatric follow-up during pregnancy and postpartum in order to detect early signs of relapse. Similarly, many of the mothers experienced early separations from their infants. Separations between mothers and infants due to mother-only psychiatric admissions pose several dilemmas, including refusal of and longer periods of admission, undermining of breastfeeding, and transfer of responsibility of caring for the infant to spouses and extended family (Wisner et al., 1996). At present, there is an absence of joint admission facilities in the Western Cape public sector for mothers with acute episodes of severe mental illness. Joint admission facilities, such as the mother-and-baby units (MBUs) recommended for the treatment of perinatal psychoses (National Institute for Health and Clinical Excellence (NICE), 2014) are widespread in the UK, Australia, Europe, Canada and New Zealand, but appear to be lacking in other parts of the world (Glangeaud-Freudenthal et al., 2011). Joint admission facilities offer an opportunity to provide specialist psychiatric care and intervention, while limiting the need for and length of separation between mother and infant. Admission to a MBU has been shown to improve maternal mental health and mother-infant interaction (Stephenson et al., 2018). In the absence of dedicated MBUs in South Africa, the accommodation of mothers with mental illness and their infants within existing district or tertiary facilities, is recommended. The period of joint admission would present an opportunity to mitigate the potential negative impact of early mother-infant separation, while providing psycho-social and psychiatric services to mothers with peripartum psychosis.

In light of the relatively high rates of unplanned pregnancy, it is recommended that women of childbearing age who have a diagnosis of a severe mental illness should be closely followed up and should receive comprehensive and proactive psycho-education regarding pregnancy planning, contraception and the use of medication. Similarly, the high rate of substance use during pregnancy

observed in this sample of mothers indicate the need for routine screening and psycho-education at primary care level. There is also a need for implementing preventative measures and targeted substance use interventions for mothers with severe mental illness. The high rate of trauma reported by the mothers in our sample also reflects the need for routine screening for trauma and domestic violence among mothers with psychiatric disorders. These mothers would benefit from therapeutic interventions to address the potential sequelae of their trauma experiences. In addition, social work intervention should be considered where mothers are in danger of domestic violence.

In light of the finding that PRF was not impaired in all mothers with peripartum psychosis, further study is warranted to examine which factors serve a protective function for this capacity. Further, additional qualitative examination of the specific impairments in reflective capacity may shed light on the particular impairments found in mothers with peripartum psychosis.

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Appendix A: Participant Information Leaflet and Consent Form

TITLE OF THE RESEARCH PROJECT:
Exploration of parental reflective function and mother-child interaction in a South African sample of women with peri- and postpartum psychosis

REFERENCE NUMBER:

PRINCIPAL INVESTIGATOR: Juané Voges
CO-INVESTIGATORS: DJH Niehaus, AM Berg
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Department of Psychiatry
Faculty of Medicine & Health Sciences
University of Stellenbosch
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CONTACT NUMBER: 021 940 4462 or 021 940 4504

Dear participant,

I would like to invite you to take part in a research project that will be conducted at Stikland Hospital. Please take some time to read the information on this leaflet, which will explain the details of this project. If there is anything that you find unclear, or if you have any questions, please ask the study staff or J. Voges to clarify or answer your questions. It is very important that you are completely satisfied that you understand what the research entails and how you could be involved. Your participation is **entirely voluntary**, which means that you are free to decline to participate. If you say no, this will not affect you negatively in any way. You are also free to withdraw from the study at any point, even if you first agree to take part.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

Description of the Research Project

This project aims to understand the thoughts and feelings of mothers who have had unusual experiences, or what is called psychotic symptoms in psychiatric language, during pregnancy or after giving birth. You may have had such experiences and this may be why the doctor at the Maternal mental health clinic referred you to this project.

This study also aims to understand how these experiences may have had an influence on how you and your new baby interact with one another. Because these experiences are fairly uncommon, we want to make sure we understand how it affects the mother and baby and their way of interacting with one another. The session will take place at Stikland Hospital, De La Haye Avenue, Bellville – telephone number: 021 940 4504. The time of the session will be arranged between you and the investigator. We hope to include about 70 people in total in this study. If you decide to take part, the following procedures will take place: You will meet with a researcher who will ask you questions about your history and about any

current strange experiences you may have. We will do an interview with you that will last about 90 minutes and also observe an interaction between you and your child, which should take less than half an hour. The interview may take some time, but you will be offered a break if you become too tired.

We would like your permission to have access to your hospital file at Stikland Hospital. We would also like your permission to video record the interview with you and the interaction between you and your child so that we are able to accurately rate these sessions. We will keep all recordings and documents safely locked in a cupboard and your name will not appear on tapes or on these written documents. For us to better understand the interaction between you and your child, a recording of your interaction with your child will be securely sent to reliable coders for coding purposes. We will provide child care at the place where we meet so you can bring your child with you.

For your participation, we only ask that you and your baby attend one session during which you will be interviewed and we will ask you and your baby to interact. You will not be paid to take part in the study, but your transport and meal costs will be covered for each visit. There will be no costs involved for you, if you do take part. This session may not directly benefit you, but it will help us to better understand how mothers and their babies are affected by psychotic experiences during pregnancy or after birth and in this way, mothers in the future may benefit from your participation. We do not foresee that there are any risks involved in your participation of the study.

You can withdraw from this study at any time you wish; you do not have to explain why you want to leave and it will not affect your treatment at Stikland Hospital. Additionally, if you feel that you need further psychological assistance, we can refer you to the Department of Psychology at Stikland for individual therapy. If you have any concerns about your child, we will also make sure that they are seen to.

To ensure that all aspects of this research are conducted in the right way, the research records may be inspected by auditors or members of the Research Ethics Committee. In the event that you would like to make contact with the Research Ethics Committee, you may call Elvira Rohland at 021 938 9677 or email ethics@sun.ac.za.

If you would like to know more about the study or have some questions, please ask Juané Voges. You will receive a copy of this information and consent form for your own records. You have the right to be informed of any new information that arises from this research and you are welcome to enquire from Juané Voges about this.

The contact details are:
021 940 4462 (J. Voges)

If you are willing to participate in this study please sign the attached Declaration of Consent.

Yours sincerely,
Juané Voges

Declaration by participant

By signing below, I ………………………………..…………. agree to take part in a research study entitled *Exploration of parental reflective function and mother-child interaction in a South African sample of women with peri- and postpartum psychosis.*

I declare that:
- I understand what is written in this form, it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time with no negative consequences.
- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

I hereby give consent to the following (please tick ✓ the appropriate box and intial):

- I hereby agree that I and my baby will participate in the study

Yes		**No**	

_____ Initial

- I give consent that my hospital file may be used for research purposes.

Yes		**No**	

_____ Initial

- To have my interview with the investigator and the observation sessions between me and my child video recorded.

Yes		**No**	

_____ Initial

- To have recordings of my interview, sessions and interaction with my child sent to reliable coders for coding purposes.

Yes		**No**	

_____ Initial

- To allow these video recordings to be used for presentations and at conferences.

Yes		**No**	

_____ Initial

Signed at (*place*) ....……......………….. on (*date*) ……………...………..

....
Participant   Witness

Appendix B: Demographic Interview

PATIENT INFORMATION SHEET

```
┌─────────────────────────────────┐
│                                 │
│                                 │
│       Place sticker here        │
│                                 │
│                                 │
└─────────────────────────────────┘
```
Date of assessment _____

Address: _____

_____

Phone number: _____ **Age:** _____

Marital status: _____ **Ethnicity:** _____

HLOE: _____ **Home Language:** _____

DOB of infant: _____ **Infant age at assessment:** _____

Family Composition

(Genogram with marital status, number and ages of children and parents indicated)

Socio-economic conditions

Employed: Y /N   If N, specify when last employed: _____

If Y, specify where, duration, position: _____

Type of housing: _____

(indicate brick or informal dwelling, renting/ sharing/ owner)

Maternal Medical history

Relevant medical illnesses: _____

_____

Substance use history: _____

_____

Trauma history: _____

_____

Health during most recent pregnancy: _____

_____

Method of delivery: _____

_____

Complications during or after delivery (mother or infant): _____

_____

Separations between mother and infant (including length): _____

_____

Infant information

Description of initial bonding: _____

_____

Feeding/Sleeping:_____

_____

Description of current attachment: _____

_____

Caregiver of infant: _____

_____

Milestones:_____

_____

Infant health: _____

_____

Mental health history

Current diagnosis as stated in file: _____

_____

Previous psychiatric admissions: _____

_____

_____

Current Psychiatric Medication: _____

_____

Stability of illness: _____

_____

PANSS + score: _____ **Highest item score:** _____

Inclusion: Y /N   **Date of appointment:** _____

Follow-up appointment: _____

Transport confirmed: Y /N

Appendix C: Parent Development Interview

I have been granted permission to use this questionnaire but I have not been granted permission to distribute it to others.

PRIVILEGED COMMUNICATION
DO NOT REPRODUCE OR DISTRIBUTE WITHOUT EXPLICIT PERMISSION

REVISED PDI-S

PARENT DEVELOPMENT INTERVIEW
REVISED

SHORT VERSION

Arietta Slade
J. Lawrence Aber
Brenda Berger
Ivan Bresgi
Merryle Kaplan

October, 2014

PRIVILEGED COMMUNICATION
DO NOT DUPLICATE OR DISTRIBUTE
WITHOUT EXPLICIT PERMISSION

This interview is an adaptation of the Parent Development Interview (Aber, Slade, Berger, Bresgi, & Kaplan, 1985). This protocol may not be used or adapted without written permission from Arietta Slade, Ph.D., Clinical Professor, Yale Child Study Center arietta.slade@yale.edu

Appendix D: Coding Interactive Behaviour System

Appendix E: Coding Interactive Behaviour Scoring Sheet	
ID#: AGE:	
ADULT SCALES	
Forcing- Physical Manipulation	
Overriding-Intrusiveness	
Acknowledging	
Imitating	
Elaborating	
Parent Gaze	
Positive Affect	
Parent Depressed Mood	
Parent Negative Affect - Anger	
Hostility	
Vocal Appropriateness, Clarity	
Parent Anxiety	
Appropriate Range of Affect	
Consistency of Style	
Resourcefulness	
On-Task Persistence	
Appropriate Structure, Limit-Setting	
Praising	
Criticizing	
Affectionate Touch	
Parent Enthusiasm	
Supportive Presence	
CHILD SCALES	
Child Gaze/Joint Attention	
Child Positive Affect	
Child Negative Emotionality, Fussy	
Withdrawal	
Labile Affect	
Child Affection for Parent	
Alert	
Fatigue	
Vocalization/Verbal Output	
Initiation	
Compliance to Parent	
Reliance on Parent for Help	
On-Task Persistence	
Avoidance of Parent	
Competent use of Environment	
Creative-Symbolic Play	

Appendix E: Coding Interactive Behaviour scoring sheet	
ID#:	AGE:
DYADIC SCALES	
Dyadic Reciprocity	
Adaption-Regulation	
Fluency	
Constriction	
Tension	
Object Oriented play	
Social Oriented play	
Infant Led	
Parent Led	

Appendix E: Health Research Ethics Approval

UNIVERSITEIT STELLENBOSCH UNIVERSITY
Approval Letter
Progress Report

29/06/2020

Project ID: 4242

Ethics Reference No: S16/01/014

Project Title: Exploration of parental reflective function and mother-child interaction in a South African sample of women with peri- and post-partum psychosis

Dear Mrs. Juane Voges

We refer to your request for an extension/annual renewal of ethics approval dated 01/06/2020 13:45.

The Health Research Ethics Committee reviewed and approved the annual progress report through an expedited review process.

The approval of this project is extended for a further year.

Approval date: 25 June 2020

Expiry date: 24 June 2021

Kindly be reminded to submit progress reports two (2) months before expiry date.

Where to submit any documentation

Kindly note that the HREC uses an electronic ethics review management system, Infonetica, to manage ethics applications and ethics review process. To submit any documentation to HREC, please click on the following link: https://applyethics.sun.ac.za.

Please remember to use your Project Id 4242 and ethics reference number S16/01/014 on any documents or correspondence with the HREC concerning your research protocol.

Yours sincerely,

Mrs. Ashleen Fortuin
Health Research Ethics Committee 2 (HREC2)

National Health Research Ethics Council (NHREC) Registration Number:
REC-130408-012 (HREC1)•REC-230208-010 (HREC2)

Federal Wide Assurance Number: 00001372
Office of Human Research Protections (OHRP) Institutional Review Board (IRB) Number:
IRB0005240 (HREC1)•IRB0005239 (HREC2)

The Health Research Ethics Committee (HREC) complies with the SA National Health Act No. 61 of 2003 as it pertains to health research. The HREC abides by the ethical norms and principles for research, established by the World Medical Association (2013). Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects; the South African Department of Health (2006). Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa (2nd edition); as well as the Department of Health (2015). Ethics in Health Research: Principles, Processes and Structures (2nd edition).

The Health Research Ethics Committee reviews research involving human subjects conducted or supported by the Department of Health and Human Services, or other federal departments or agencies that apply the Federal Policy for the Protection of Human Subjects to such research (United States Code of Federal Regulations Title 45 Part 46); and/or clinical investigations regulated by the Food and Drug Administration (FDA) of the Department of Health and Human Services.

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Appendix F: Provincial Health Research Approval Letters

Western Cape Government

Health

STRATEGY & HEALTH SUPPORT

Health.Research@westerncape.gov.za
tel: +27 21 483 6857: fax: +27 21 483 9895
5th Floor, Norton Rose House,, 8 Riebeek Street, Cape Town, 8001
www.capegateway.gov.za)

REFERENCE: WC_2016RP9_833
ENQUIRIES: Ms Charlene Roderick

Stellenbosch University

Matieland

Private Bag x1

Cape Town

7535

For attention: Mrs Juane Voges, Prof Astrid Berg, Prof Dana Niwhaus

Re: **EXPLORATION OF PARENTAL REFLECTIVE FUNCTION AND MOTHER-CHILD INTERACTION IN A SOUTH AFRICAN SAMPLE OF WOMEN WITH PERI- AND POST-PARTUM PSYCHOSIS.**

Thank you for submitting your proposal to undertake the above-mentioned study. We are pleased to inform you that the department has granted you approval for your research.

Please contact following people to assist you with any further enquiries in accessing the following sites:

Stikland Hospital   **Liezle Koen**   **021 940 4570**

Kindly ensure that the following are adhered to:

1. Arrangements can be made with managers, providing that normal activities at requested facilities are not interrupted.

2. Researchers, in accessing provincial health facilities, are expressing consent to provide the department with an electronic copy of the final feedback (**annexure 9**) within six months of

completion of research. This can be submitted to the provincial Research Co-ordinator (Health.Research@westerncape.gov.za).

3. In the event where the research project goes beyond the *estimated completion* date which was submitted, researchers are expected to complete and submit a progress report (**Annexure 8**) to the provincial Research Co-ordinator (Health.Research@westerncape.gov.za).

4. The reference number above should be quoted in all future correspondence.

Yours sincerely

AT HAWKRIDGE.

DR A HAWKRIDGE
DIRECTOR: HEALTH IMPACT ASSESSMENT
DATE: 7 | 9 | 2016.

Western Cape Government

Health

TYGERBERG HOSPITAL
REFERENCE:
Research Projects
ENQUIRIES: **Dr GG**
Marinus
TELEPHONE:**021 938 5752**

Ethics Reference: S16/01/014

TITLE: **Exploration of parental reflective function and mother-child interaction in a South African sample of women with peri - and post-partum psychosis.**

Dear Mrs J Voges

PERMISION TO CONDUCT YOUR RESEARCH AT TYGERBERG HOSPITAL.

1. In accordance with the Provincial Research Policy and Tygerberg Hospital Notice No 40/2009, permission is hereby granted for you to conduct the above-mentioned research here at Tygerberg Hospital.

2. Researchers, in accessing Provincial health facilities, are expressing consent to provide the Department with an electronic copy of the final feedback within six months of completion of research. This can be submitted to the Provincial Research Co-Ordinator (Health.Research@westerncape.gov.za).

DR GG MARINUS
MANAGER: MEDICAL SERVICES

DR D ERASMUS
CHIEF EXECUTIVE OFFICER
Date: 3 May 2017

Administration Building, Francie van Zilj Avenue, Parow, 7500   Private Bag X3, Tygerberg, 7505
www.capegateway.gov.za

STRATEGY & HEALTH SUPPORT

Health.Research@westerncape.gov.za
tel: +27 21 483 6857: fax: +27 21 483 9895
5th Floor, Norton Rose House,, 8 Riebeek Street, Cape Town, 8001
www.capegateway.gov.za)

Western Cape Government

Health

REFERENCE: WC_2017RP33_379
ENQUIRIES: Ms Charlene Roderick

Stellenbosch University

Matieland

Private Bag x1

Cape Town

7535

For attention: Mrs Juane Voges, Prof Astrid Berg, Prof Dana Niwhaus

Re: **Exploration of parental reflective function and mother-child interaction in a South African sample of women with peri- and post-partum psychosis.**

Thank you for submitting your proposal to undertake the above-mentioned study. We are pleased to inform you that the department has granted you approval for your research.

Please contact following people to assist you with any further enquiries in accessing the following sites:

Karl Bremer Hopital	**Dr De Vries Basson**	**021 918 1205**

Kindly ensure that the following are adhered to:

1. Arrangements can be made with managers, providing that normal activities at requested facilities are not interrupted.

2. Researchers, in accessing provincial health facilities, are expressing consent to provide the department with an electronic copy of the final feedback (**annexure 9**) within six months of completion of research. This can be submitted to the provincial Research Co-ordinator (Health.Research@westerncape.gov.za).

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3. In the event where the research project goes beyond the *estimated completion* date which was submitted, researchers are expected to complete and submit a progress report (**Annexure 8**) to the provincial Research Co-ordinator (Health.Research@westerncape.gov.za).

4. The reference number above should be quoted in all future correspondence.

Yours sincerely

DR G DENICKER

ACTING DIRECTOR: HEALTH IMPACT ASSESSMENT

DATE: 13-04-2017