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On Mothers with Schizophrenia:

Assessment of Early Infant Caregiving Capacity & the Contribution of Cognitive Deficits

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A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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Abstract

An Australian national research priority is *a healthy start to life*, requiring a good-enough nurturing environment in infancy. Mothers with schizophrenia are a group who struggle to provide this early foundation, with up to 50% of their infants removed from their care. There are major limitations to our service provision and the state of our knowledge regarding the impact of schizophrenia upon early parenting. Regarding service provision, there is currently no instrument to validly assess the parenting of mothers with schizophrenia. Treatment approaches and decisions regarding custody are presently guided by parenting assessments that are not appropriate nor specific to this cohort. Regarding the state of our knowledge, it is still not known what it is about schizophrenia that interferes with the ability to parent. The current literature demonstrates that symptomatology and psychosocial variables do not adequately explain the extent of dysfunction that is seen in this parenting group.

In an attempt to address the above limitations, the following study aimed to develop and validate a measure of infant parenting that is appropriate for use in schizophrenia. The second aim of the study was to compare the infant caregiving of mothers with schizophrenia to that of clinical and healthy postpartum controls. It was hypothesised that schizophrenia-associated cognitive deficits would account for a significant proportion of the difficulty experienced by mothers with schizophrenia.

Fifty one postpartum mothers participated in the study. The sample comprised a schizophrenia group (n=13), a clinical control group (mothers with a mood disorder; n=13), and a healthy control group (n=25). The psychometric properties of the Infant Caregiving Assessment Scales (INCAS) were examined using a 12-month prospective longitudinal

design. A cross-sectional design was concurrently used to determine the extent to which schizophrenia-associated cognitive deficits affect the capacity to care for a new infant, relative to symptoms and psychosocial variables.

Early findings suggest that the INCAS is reliable and valid for use in the postpartum schizophrenia population. Compared to the clinical and healthy control groups, mothers with schizophrenia exhibited specific impairments to their infant caregiving in the dimensions of *empathy*, *adaptability*, *protection* and *provision*. A significant relationship between caregiving capacity and schizophrenia-associated cognitive deficits was found in the study at hand. Through regression analyses, it was shown that the *total neurocognition* and *processing speed* variables were significant predictors of caregiving capacity (as measured by the INCAS). When clinical and psychosocial variables were included in the model however, these relationships were no longer significant. These findings suggest that there is not a direct relationship between neurocognition and infant caregiving, or alternatively, that the relationship is only slight. Regarding social cognitions, *facial affect recognition* and *attributional style* retained significance as predictors of infant caregiving capacity when other variables were added to the model. Using path analyses, it was clarified that although the neurocognitive deficits did not directly impair the maternal role functioning of women with schizophrenia, they impaired it indirectly through their negative impact upon *social cognition*. A major limitation was the very small sample size. Within the context of only 51 participants, the findings should be viewed as preliminary. Further studies that replicate these findings in larger samples are required.

This important and innovative research project has introduced an evidence-based caregiving assessment for mothers with schizophrenia. The INCAS has the potential to help this group provide a healthy start to life to their infants by assisting in the careful examination and identification of problems early in the caregiving relationship. While still only in the early stages of validating this scale, the INCAS has helped to provide an early indication of the caregiving dimensions affected by schizophrenia, together with the cognitive aspects of the illness that may be responsible for this specific area of functional impairment. With the feasibility of this research established in the current thesis, the way is paved for future research to go forth.

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This brings me to thank my own family, whose nurturance and encouragement have been ever-present through this process, right alongside all those hot dinners. As well as my parents, thanks go to my parents-in-law, who have been so very helpful and kind.

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Introduction

Parenting is impaired in many mothers with psychiatric illness, most markedly in schizophrenia. Barriers to parenting competence in schizophrenia include clinical features such as symptoms and medication side-effects, illness-related neurocognitive and social cognitive deficits, and the psychosocial and socioeconomic disadvantages that often accompany psychiatric illness. While maternal caregiving dysfunction is well-documented in relation to women with schizophrenia, it is not clear which aspects of the illness are responsible. Infant caregiving dysfunction leads to the removal of one in every two children in Australia where maternal schizophrenia is present, causing great trauma and heartbreak to all concerned. Without being able to define what is wrong with the parenting of mothers with schizophrenia and how the illness occasions this impairment, our ability to assess, monitor and remediate is limited. The current thesis aims to address this lacuna.

As a first step, a parenting capacity assessment tool is required that is reliable and valid, comprehensive regarding infant developmental needs, and fine-grained enough to break down the difficulties of these mothers into manageable and treatable parts. There are currently no assessments of early parenting capacity in practice that meet these requirements.

In developing the Infant Caregiving Assessment Scales (INCAS), I have set out to address this clinical need. The INCAS measures caregiving capacity using task-specific, criterion-referenced and ecologically valid methodology, yielding a fine-grained and rounded assessment of early caregiving that will facilitate clinical management. In the research setting, the INCAS will enable the evaluation of interventions and hypotheses relating to early infant caregiving capacity and psychopathology.

In the clinical setting, the INCAS provides a structured framework within which complex presenting problems can be analysed and re-framed in terms of their composite parts. By breaking down the tasks of intervention in this way, it is hoped that parenting situations that would otherwise be terminated can be assessed and remediated instead. In doing so, it is hoped that the INCAS will create a basis upon which targeted interventions can be developed, providing alternative options to the dichotomy of 'remove vs don't remove' when considering the infants of mothers with severe psychiatric illness.

This thesis begins by defining parenting capacity with reference to normal infant development. Schizophrenia and the way the syndrome can impact upon parenting capacity is next considered, particularly relating to the ways in which clinical and cognitive aspects of schizophrenia can influence infant caregiving capacity. Next, the available parenting capacity instruments for this cohort are reviewed, and the INCAS, a novel measure of early infant caregiving capacity for postpartum mothers with schizophrenia, introduced. In Chapter 5, the psychometric development of the INCAS and its validation is examined in detail. The scale is then used in Chapter 6 to investigate early parenting capacity in schizophrenia, relative to mood disordered and healthy controls. In particular, the effects of psychopathology, neurocognition and social cognition upon early caregiving capacity are evaluated. Finally, the performance of the INCAS is critically evaluated and its potential uses in assessment and treatment are discussed along with the implications of the cognitive findings.

It is clear that we need to improve the small repertoire of solutions that are currently available for the assessment and management of mother-infant dyads that are affected by maternal schizophrenia. The INCAS serves as a starting point towards reorienting management of this very difficult situation away from having to decide whether or not to remove a child and towards assessing and building capacity. While fathers have an equally important place in early caregiving, parenting capacity will be examined in relation to mothers in the current instance, due to the high rate of single parenthood in schizophrenia.

Literature Review

Chapter 1: Normal infant development: The first year

This chapter will begin by introducing normal development of the human infant. Tasks of the newborn and developmental needs throughout the first year will be discussed, and the link between early caregiving, neurological development and socio-emotional adjustment will be elucidated. In defining the developmental needs of an infant, the stage will be set for the subsequent chapter, which will focus on early parenting capacity.

Markers of development at 12 months of age include cognitive, physical, and communicative capacities together with an organised and secure mother-infant attachment. The success with which developmental milestones are met during the first year depends on a combination of genetically programmed developmental maturation, temperamentally determined capacity to tolerate the environment, and the quality of the early caregiving relationship. This relationship provides a holding environment that supports the infant's early development (Bion, 1962a); Winnicott (1965). Within this environment, a stable pattern of mother-infant relating is established, forming the basis of enduring attachment.

Tasks of the newborn

Engaging the caregiver

The newborn infant's preference for human faces, moving objects and human speech patterning all contribute to the earliest task of connecting with the mother and eliciting nurturance. By and large, infants are curious, attentive and exploratory and this stimulates the caregiving relationship.

A large in utero brain-to-body ratio renders the human infant relatively immature compared to other live born mammals and thus dependent upon the mother following birth. The infant's innate interactional capacities serve to engage the mother's caregiving system. Throughout the first year, the infant's ability to effectively communicate increases as each sensory capacity develops further. Touch is the infant's first form of communication, followed closely by hearing, olfaction and taste (Brazelton, 1993). Vision then gains prominence in the communicative repertoire and by one year, the rudiments of speech burgeon forth.

Establishing homeostasis

Birth comes as a startling event to the infant and the task of adjustment is vast. The extrauterine world contains lights, sounds, temperatures, increased gravity, and sensations that are difficult to organise. Birth marks the beginning of a need to breathe and maintain body temperature, capacities that require physiological adaptations to respiration, metabolism and internal homeostasis.

Achieving and maintaining a sleep state outside the womb is another early task for the newborn. Habituation to new sounds and sensations takes adjustment and requires the support of an available caregiver. It is up to the mother to attune herself to signals of the infant's autonomic distress, such as changed skin colour, irregular breathing, and startling, together with signals of emotional stress, such as active averting, inconsolability, sleeplessness and restlessness (Brazelton, 1993). Sensitive caregiving involves adjusting the situation to a developmentally tolerable sensory level in response to the infant's signals of disturbance.

Development and developmental needs throughout the year

With the caregiver engaged and homeostasis re-established, cognitive development progresses forth over the year. Piaget viewed infant development as a continuous process of adaptation to the world. He coined the first two years *the sensorimotor period of intelligence*, describing six distinct sub-stages within this (Piaget, 1962). Although Piaget may have underestimated the age at which some abilities emerged, subsequent research has generally confirmed that the stages unfold in his proposed order.

As the infant's mobility increases over the first year, a solidified understanding of causality develops. This understanding, together with the ability to mobilise, becomes linked to an awareness of physical danger. In a landmark experiment by Robert Emde, it was demonstrated that babies make important judgements regarding their physical safety by evaluating cues contained in the facial affect, gestures, and speech of their parents, a process known as social referencing (Emde, 1992). Together with social referencing, imitation is a powerful mode of learning at this stage.

At nine months, the concept of being separate from the mother deepens with the burgeoning of gross motor development. While adjusting psychologically to this increasing feeling of separateness, the infant appears to become more dependent emotionally. The ability to move effectively from room to room, checking and re-checking if the parent is still there, helps the infant's growing sense of object permanence, and importantly, of person (caregiver) permanence (Brazelton, 1993).

By twelve months, most infants have combined all of their sensory and motor achievements to walk independently, reaching a stage of development that is equal to many other species at the time of parturition. The heightened independence and sense of mastery in the infant is usually accompanied by a fresh host of ambivalence and fears, again highlighting the close relationship between motor and emotional development (Brazelton, 1993).

The centrality of the primary caregiving relationship

Alongside physical and cognitive development, a core task of infancy and the remainder of the lifespan involves unlocking the capacity to regulate emotion (Calkins, 2007; Sroufe, 1996). While to a large extent this is contingent upon physical development, social elements are equally intrinsic. Although inherited temperament and biological factors are relatively fixed at birth, the neural circuitry involved in emotion-regulation develops postnatally within interactions in the caregiving environment. In this way, the primary caregiving relationship is central in the development of emotion regulation.

The socially driven nature of infant development was emphasised by Bowlby in his theory of attachment (Bowlby, 1973, 1982). Building upon Klein's theory of object relations and earlier analytic writing, attachment theory advocated for a move away from instinctual drives as primary motivators for interrelatedness in preference of *affective states*. Bowlby placed particular emphasis on the affects stemming from physical vulnerability that cause a desire for comfort and protection. Emotional development, according to attachment theory, involves the formation of a healthy representation of the self, others, and the self in relation to others in what is known as an 'Inner Working Model' (Bowlby, 1973, 1982). Development of an adaptive Inner Working Model is promoted not just by the adequacy of drive reduction by the mother, but importantly, through her consistently sensitive response to the infant's *affective states* through consistent and reliable care.

The term 'attachment' can be defined as the necessary unity of the primary caregiver and infant from the outset of extrauterine life (Bowlby, 1973, 1982). During the first year of life, the infant dedicates cognitive, emotional and physical resources to securing the mother's proximity. In doing so, the infant adopts a tailored behavioural strategy that is experienced as effective for maintaining the mother's availability (Dolby, 1996). The attachment relationship in its formative phase shares elements with Sameroff's transactional learning environment (Sameroff & Fiese, 1990).

In his research involving rhesus monkeys, Harry Harlow produced evidence for Bowlby's theoretical tenet that the infant's desire for proximity to the mother is motivated by emotional yearnings as well basic physical satiation (Harlow, 1958). Harlow was influenced by the earlier work of Rene Spitz surrounding institutionalised infants during the 1940's (Spitz, 1946a, 1946b). During this time-frame, there was a high rate of mortality among infants in orphanages that was explained as a 'failure to thrive'. Spitz asserted that this 'failure to thrive' was a consequence of emotional impoverishment. Throughout his research using primates, Harlow's (1958) overriding assumption was that there is a developmental need for emotional comfort in infancy. In one of his studies, infant monkeys were separated from their mothers after birth and placed with surrogate 'mothers'(Harlow, 1958). Each monkey resided with two wire mesh 'mothers', one wrapped in soft cloth, and the other with the wire still exposed (see Figure 1 below).

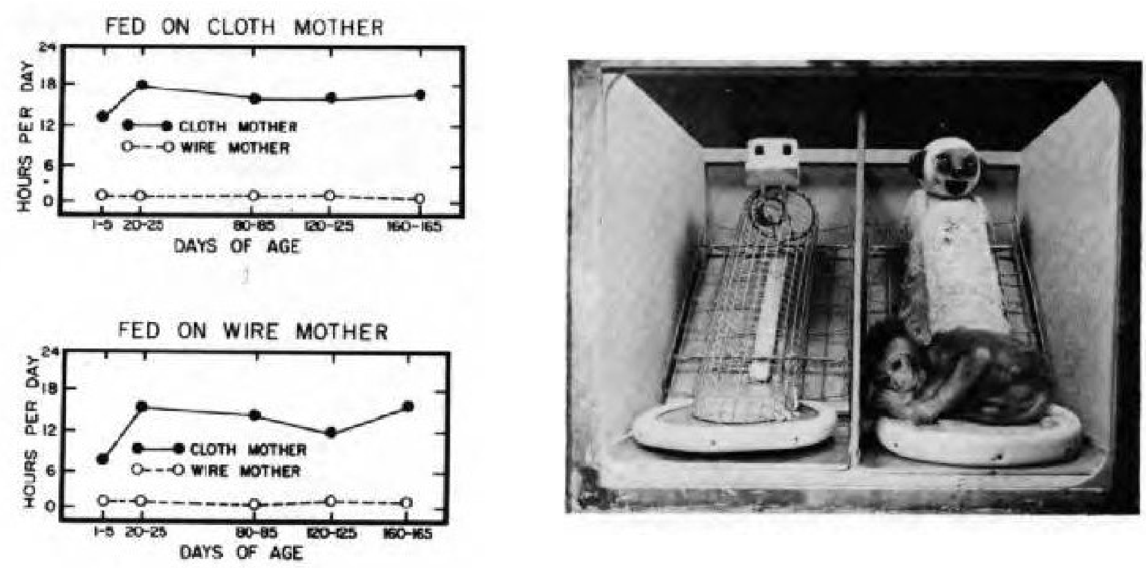

Figure 1. Preference for the cloth mother.

Regardless of which 'mother' held the milk bottle, the monkeys demonstrated an unwavering preference for the cloth-covered mother. This was interpreted to suggest that a want for *emotional comfort* took precedence over a drive towards satiation (Harlow, 1958). This preference became clearer when conditions of threat were induced in a subsequent study. Frightened monkeys were seen to huddle against the cloth-covered 'mothers', again, regardless of where the milk bottle was located.

In another of his studies called the 'open-field situation', anxiety was induced experimentally with a procedure that not unlike Ainsworth's Strange Situation Procedure (detailed later). Infant monkeys were placed in a strange room with unfamiliar play objects and observed with and without the cloth mother being present. Interestingly, the monkeys were only able to explore and play freely with the materials when accompanied by their cloth-covered mothers (see Figure 2 and Figure 3).

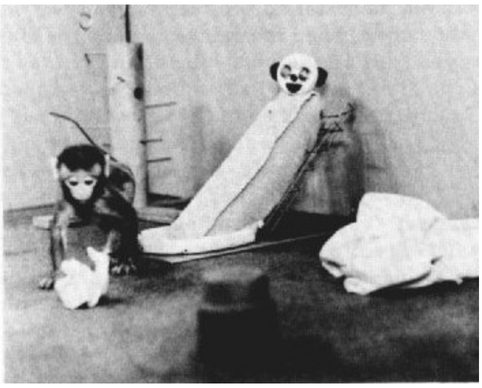

Figure 2. Object exploration in the presence of the mother surrogate

Figure 3. Response to the situation in the absence of the mother surrogate.

In another of his studies, Harlow compared the developmental outcomes of monkeys with exposed wire-mesh vs. cloth-covered surrogates. In each case, the surrogates were equipped with milk, and between the two groups, there was no difference in amount of milk consumed or in physical weight gain. There was, however, a crucial between-group difference, in that the excrement of the cloth-covered group was softer than that of monkeys in the wire-mesh group, whose faeces were significantly harder and drier. This suggested that there are very real physiological effects associated with the quality of emotional caregiving during infancy. Where the wire mothers were biologically adequate for the infant monkeys, they were inept for psychological adjustment. As suggested by Spitz, Harlow had shown evidence that sound infant development requires more than the gratification of basic primitive drives. Harlow's findings also supported Bowlby's notion that affects stem from relational factors rather than solely from Freud's 'drives'.

The subsequent work of Mary Ainsworth translated some of these early findings to human infants. Ainsworth was inspired by the work of James Robertson (Robertson, 1989), which highlighted that trauma was occasioned to small children by confining them in hospital without their parents. Ainsworth went on to adapt Robertson's findings to her own early research in Uganda. Here she studied 28 dyads over the course of 12 months using naturalistic mother-infant observation. Ainsworth found that the infants worked actively at maintaining the proximity of their mothers using tailored behavioural strategies. She observed each of the infants to learn a strategy that worked for their own particular mother. Differential crying, settling, smiling and vocalising in response to their own versus other mothers showed that these attachment relationships were not transferrable; each mother seemed irreplaceable to her infant (Karen, 1990).

Ainsworth went on to replicate her findings in Baltimore with 26 North American mother-infant pairs (Ainsworth, Blehar, Waters & Wall, 1978). Each dyad was visited for repeated home observations across the first year of infancy. The attachment behaviours first observed in Uganda were again seen in the American babies. As in Harlow's work, another poignant finding in both human populations was the strong link between infant exploration and maternal proximity. Where infants felt secure that their mothers were nearby, they were able to interact with the environment. When stressed and unable to freely access the mother, these same infants lost interest in playing and became less productive in their outward explorations (Karen, 1990). This finding suggested that the mother's emotional comfort was necessary for adequate infant exploration and learning, adding to Harlow's empirical evidence against the drive-based nature of interrelatedness.

To systematise this research and solidify her findings, Ainsworth developed the Strange Situation procedure (SSP)(Ainsworth et al., 1978) (detailed later in the Methodology). This eight-step procedure was the first measure of Bowlby's mother-infant attachment, and remains the gold-standard procedure in use today. Using the SSP, Ainsworth elucidated three major categories of mother-infant attachment; Secure (B), Avoidant (A), and Ambivalent (C) (Ainsworth et al., 1978). The first study utilising the SSP involved dyads who had been observed through the first year of life. The data were synthesised such that associations between early caregiving and later attachment type were discernible. In the year leading up to the SSP study, detailed observations had been recorded around each mother's style of responding to her infant with regard to feeding, crying, cuddling, eye contact, and smiling. Ainsworth's pioneering body of work showed that attachment category at one year emerges in concordance with the quality of early parenting experienced by the infant (Karen, 1990).

Secure Attachment

Secure attachment emerged following a year filled with high levels of maternal responsivity. Signalling by these infants had been reliably answered with action by the mother, usually in the form of approaching and holding. During the SSP, secure infants were openly upset when their mothers left the room, and were active in approaching the mother for comfort during reunions. When a mother comforted her securely attached baby, the relationship appeared intimate, and it was seen that the sensation of closeness was enjoyed, with the infant ‘moulding’ into the mother’s body when embraced. Calm was easily restored in secure infants, after which playing, exploring and learning were again possible, and engagement with the environment was easily re-established.

Insecure Attachment

By and large, insecurely attached infants classed as Avoidant (A) or Ambivalent (C) were those who had experienced a pattern of *reliably unreliable* care during their first year. Their mothers had responded in a predictable (yet unhelpful) way which the baby had come to anticipate. In contrast to secure babies, it was thought that the strategies of insecure infants had been developed to manage mothers who had been unavailable, poorly attuned, or inconsistent in their responding.

Infants with avoidant attachment relationships were those who had been rejected or avoided by their mothers in response to their distress and bids for comfort. These infants had learnt to overregulate their distress and conceal their desire for proximity at these times as a way of avoiding being ‘left’. Avoidant attachment follows a history of the mother moving away (emotionally and/or physically) from the infant in response to his distress. These infants quickly learn to conceal their distress as a way of avoiding separation. When assessed for attachment type, avoidantly attached infants appeared impervious to separations when in the presence of their mothers. Although distress was still felt at the mother’s departure, playing took precedence while she was both in- and outside of the room and was only briefly discontinued when covert glances were cast in her direction. Despite less overt distress however, the overall cardiac measures of avoidantly attached infants have been found to indicate negative arousal patterns that are similar to secure infants during mother-infant separation (Spangler & Grossmann, 1993). Unlike securely attached infants, the playing engaged in by avoidant infants appeared half-hearted and unproductive in Ainsworth's study (Ainsworth et al., 1978). There was an emphasis upon mastery and exploration within these dyads, and emotional needs were either dampened or concealed by the infants. The mothers of avoidant infants were for one reason or another not comfortable when their infant was distressed or needing support. It appeared that a uniform consequence of this was the infant's precocious independence.

Infants of insecure ambivalent attachments seemed preoccupied with vigilantly 'monitoring' their mothers during the SSP. This followed a history of unreliable responding during times of need, coupled with intrusive involvement during efforts at exploration, throughout the preceding year. These mothers seemed uncomfortable with their infants' bids for separation and independence, yet when their proximity was desired, they tended not to respond unless the infant was prostrate with need. Their responsivity to bids for proximity was unreliable, and the infants learnt to exaggerate their expressions of distress to increase the likelihood of eliciting a response. During the SSP, distress was expressed by ambivalent infants in exaggerated form during episodes of separation. The mother's return appeared to heighten this distress, with the baby often stiffening when embraced. These infants seemed inconsolable for longer than infants in other attachment categories, and re-engagement with the toys was not always possible (Ainsworth et al., 1978;Cassidy & Berlin, 1994).

Disorganised Attachment

A proportion of the infants assessed by Ainsworth had not fallen clearly into any one category. These infants would often show elements of avoidance or ambivalence, but failed to consistently apply the same strategy in response to the distress that was associated with separation (Main, 1996). Their observed reunion behaviours were often confusing, with reactions of freezing and even collapsing. It was eventually concluded that the similarity between these infants was their lack of any organised pattern of attachment. A fourth category of attachment, coined 'Disorganised (D)', was added by Mary Main to describe those relationships within Ainsworth's earlier studies where no organised proximity-gaining strategy had been displayed (M. Ainsworth, Blehar, M., Waters, E., Wall, S., 1978; Main, 1996). At times these infants appeared both afraid of their mothers and simultaneously in need of her comfort. The mothers of these infants at times appeared frightened, and at other times seemed frightening to their infants. Disorganised infants seemed to be in a situation of 'fear without solution', appearing unable to effectively utilise the mother to dyadically regulate distress (Lyons-Ruth, Bronfman & Parsons, 1999; Main, 1996 ; Van Ijzendoorn & Bakermans-Kranenburg, 1999).

The Inner Working Model

It is a tenet of Attachment theory that the self is firstly sensed and then tested for agency within the survival-driven confines of the primary caregiving relationship. As the first figure of attachment, the primary caregiver communicates with the infant before language is available to organise experience. Without having been encoded in verbal form, the earliest template for relating perpetuates in procedural memory. In this way, the first attachment relationship imparts an Inner Working Model (IWM)(Bretherton, 1999) of the self in isolation and in relation to others that continues to influence the ease with which interpersonal support is used through the remainder of the lifespan (Dolby, 1996). The IWM is an abstraction of the earliest caregiving relationship that guides ongoing relational expectations and behaviours. Within the study at hand, the Strange Situation procedure (SSP) has been used as an index of emotional development.

Neurological aspects of socio-emotional development

Attachment formation and neurological maturation are mutually facilitative processes. Both promote the beginnings of self-regulation and a move towards emotional competence. The Inner Working Model (IWM) is a portable component of the attachment relationship that can be used when the dyad are apart. It contains a script-like collection of memories based on a year-long pattern of distress-relief cycles with the caregiver. The IWM is held in procedural memory and consolidates as the brain's functional complexity evolves. Hippocampal and temporal lobe development promote object permanence which combines with the IWM to increase the infant's belief in the mother's continued existence during separations and with this, a growing sense of trust that she will return. In such a way, attachment is facilitated by neurological maturation, and this stimulates the brain to develop further.

The regular response to the primary caregiver during infancy stimulates structural and functional connectivity throughout the brain (Lamb, Teti, Bornstein, & Nash, 2002; Oyama, 2004). As cerebral-limbic connectedness strengthens, the prefrontal cortex (PFC) gains access to the Hypothalamic-pituitary-adrenal (HPA) axis involved in the regulation of arousal (Oyama, 2004). Normal development of inter-regional brain connectivity requires contained and modulated social experience during infancy. The absence of early attachment can impede the development of prefrontal-limbic connectedness and with this, the development of self-regulation (Rutter & O'Connor, 2004).

The fight-flight response is potentiated within the limbic system and is communicated biochemically to the body. When threat is detected, the amygdala activates the HPA axis and the stress response is triggered (see Figure 4). The stress response is terminated by feedback originating in the PFC, which in infancy is not functionally mature. Infants are unable to down-regulate autonomously and benefit from the caregiver's containment.

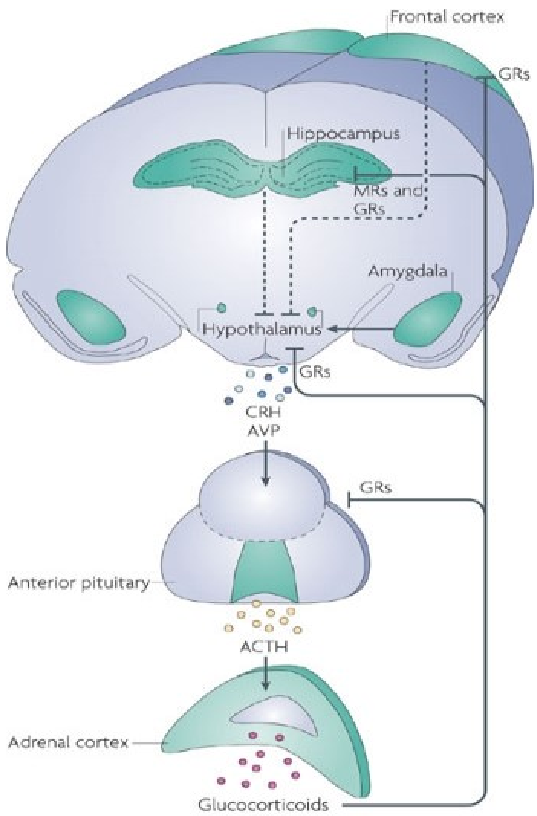

Figure 4. The stress response (adapted from Lupien, McEwen, Gunnar, & Heim, 2009)

The subcortical limbic system is the 'oldest' part of the brain and gains functionality much earlier than the cortex. Markers of cortical maturation and functional integration occur first in primary motor and sensory areas and latest in the PFC (Huttenlocher & Dabholkar, 1997). In view of the PFC's slower development relative to the limbic region, the mother needs to compensate for functional immaturity by containing the infant's arousal externally.

The limbic system is located within the core of the brain and is receptive to emotional stimuli. When expecting danger, the HPA axis responds by producing physiological and behavioural changes which ready the body for action. Although helpful in the short-term for mobilising defences, chronic over-exposure to cortisol during infancy can cause the HPA axis to become permanently sensitised. Excessive exposure to cortisol has been linked to observations of structural damage (neuronal atrophy) and impaired function of the hippocampus (McEwen & Milner, 2007) and amygdala {(Brown, Woolston & Frol, 2008). A primary role of mother during infancy is to protect the infant's brain against excessive stress by buffering against hyperarousal in the infant and curtailing exposure to stressful stimuli.

The PFC integrates environmental information with inner affective states. Through its interconnectedness with the subcortical limbic system, the PFC regulates emotional reactions to extrinsic environmental events. Where a situation is evaluated and threat is discounted, the PFC activates the parasympathetic nervous system, which dampens physiological arousal and continues hormonal and gene-mediated activity that normalises bodily processes and prepares for future activation (de Kloet, Joels, & Holsboer, 2005). The mother scaffolds the development of cortico-limbic connectivity by at first carrying out the dampening function for her infant. As connections between the infant's PFC and limbic system are reinforced throughout the lifespan, the PFC takes over the regulatory function and the mothers' involvement in the process recedes.

The ramifications of social deprivation in infancy can pervade neuroanatomical development. A major aspect of socio-emotional development involves the acquisition of self-regulatory capacities, which begins in concert with neurological development under the influence of the caregiver. Reinforcement of cerebral and limbic connectivity allows both regions to influence emotional functioning, and ongoing stress resilience develops (Feder, 2009). Synaptic and inter-regional connections are reinforced through repetition, appropriate and containing experiences fostered by good mothering help optimise this connectivity. There is a sensitive window of time in which the caregiver's input (external regulation of affect) is most able to influence cerebro-limbic connectivity (Rutter & O'Connor, 2004).

The absence of the mother's regulatory interaction exposes the infant to the threat of unmodulated stress, which has the potential to permanently over-sensitise the HPA axis. Impoverished emotional caregiving during infancy (such as leaving the infant in hyper-aroused states with no means of down-regulating) has the potential to damage neurological and socio-emotional development.

Emotional nurturance: Evidence for a sensitive window in infancy

Rene Spitz's idea of a 'sensitive period' describes a special openness to, or requirement for, certain kinds of experience during a particular period (Emde, 1992). Lenneburg (a linguist and neurologist practicing in the 1960's) popularised Spitz's notion of a sensitive period in his research surrounding language acquisition (Lenneberg, 1967). The notion of a sensitive period for certain aspects of development is supported by the research on brain development which demonstrates that many neural developments do not take place unless specific stimulation is present during dedicated time points (Bruer, 1999; Kuhl et al., 1997; Le Grand, Mondloch, Maurer, & Brent, 2001).

The genetic make-up of an infant interacts with the quality of early emotional nurturance and the extent of early exposure to environmental stress to determine the stress response system's ongoing capacity to cope with stimuli throughout the lifespan. Inadequate early caregiving that is devoid of mutual distress regulation can combine with enhanced genetic vulnerability to produce a toxic developmental environment for an infant's stress system (Feder, 2009). Repercussions of inadequate containment and stimulation in infancy are well documented in the literature relating to early deprivation.

Figure 5. Photographs from Romanian orphanages.

Studies of neurological and behavioural outcomes concerning institution-raised infants demonstrate clinically significant levels of inattention, overactivity, impulsivity, and social impairment in children who were emotionally deprived as infants (e.g. Behen, Helder, Rothermel, Solomon, & Chugani, 2008; Behen et al., 2009; Chugani et al., 2001). They document a mild overall impairment in neurocognitive functioning, together with a pattern of specific deficits in language processing, memory, and executive functioning among children exposed to early deprivation (Chugani et al., 2001). Positron emission tomography has revealed reduced glucose metabolism bilaterally in the orbitofrontal gyrus, infralimbic prefrontal cortex, amygdala, hippocampus, lateral temporal cortex, and the brain stem (Chugani et al., 2001).

A common finding among children deprived of socio-emotional interaction and nurturance in infancy is that of severely compromised inter-regional connectivity between the limbic and paralimbic systems. Reduced fibre density, axonal diameter and myelination in the white matter tracts connecting the limbic region with the frontal, temporal and parietal regions has been observed (Eluvathingal, Chugani, Behen, Juhasz, Muzik, Maqbool, Chugani & Makki, 2006; Govindan, Behen, Helder, Makki & Chugani, 2010; Kumar, Behen, Singsoonsud, Veenstra, Wolfe-Christensen, Helder & Chugani, 2013), together with compromised connectivity between Wernicke's and Broca's areas (Kumar et al., 2013). Most problematic for infant outcome is the impoverished connectivity between the limbic and frontal regions of the brain which, as outlined earlier, plays an integral long-term role in emotion regulation and socio-emotional functioning.

Studies of 'wild' or 'feral' children provide a supporting example of specific developmental windows being 'missed' through lack of experiential stimulation within a certain time-frame. The most notorious case of a child raised in the absence of human interaction or language concerns a girl, Genie, who was found at 13 years of age following a history of imprisonment in a locked room, where she had been fastened to a chair. Throughout childhood she had been physically punished for attempts at interaction, such that by 13 years of age, she had not acquired language or other social capacities such as empathy, social inhibition, or theory of mind. Despite intensive intervention by a clinical team, Genie never gained the ability to communicate using language. It was thought that she had missed the window for learning language, as she was never able to put words together in a meaningful way, despite several years of remediation (Fromkin, 1974).

Rutter and colleagues (2004) demonstrate the importance of sensitive periods in other aspects of human development, showing that where Romanian orphans were deprived of any social or cognitive stimulation or emotional nurturance during a sensitive time-frame, normal cognitive and emotional development did not occur, with some capacities failing to improve following placement into conventional family homes (Rutter & O'Connor, 2004).

The lack of association between attachment disorder and malnutrition or head circumference seems to suggest that there are no grounds for implicating active neural damage in the disturbed attachment patterns of these children. Rather, the evidence shows that it is more likely explained by deprivation during the sensitive period for selective attachment formation, which is between approximately 6-12 months of age and based on social interactions with at least one personally dedicated primary caregiver (Cassidy & Shaver, 1999). Impaired selective attachments and indiscriminate friendliness was evident in children admitted to institutions in infancy, but not in those whose institutional care began in middle childhood (Wolkind, 1974). Data collection at 4 at 6 years of age in children removed from orphanages (long after normal high-quality family rearing had been instituted) showed a stability of the adverse attachment-related sequelae, again suggesting that certain developmental milestones can only occur in specific windows of time. The research on institution-raised infants adds evidence to the tenet that that there is a period in infancy during which certain stimulation is required in order for specific neurological and socio-emotional developments to take place, and that it is only within this timeframe that the stimulation will promote that aspect of development.

The gross environmental deprivation presented by conditions in the orphanages led to cognitive impairment in the infants (Rutter & O'Connor, 2004). The relationship between sub-nutrition (indexed by weight) and head circumference (an indicator of brain growth) during infancy and cognitive impairment at 4-6 years of age suggests inadequate brain development as the cause of cognitive impairment. This relationship together with the high levels of stress and an absence of stimulation during the sensitive early developmental period suggests a neural basis for the later cognitive impairment (Rutter & O'Connor, 2004). It can be concluded that the pervasive deprivation posed by abnormally severe restriction of human interaction and experience falls outside the range of expectable environments required for normal human neurological development in infancy. The significantly lower rate of cognitive impairment in those infants removed from institutions prior to 6 months of age in comparison to those removed after the age of 2 years suggests a bracket of sensitivity for certain aspects of neurological growth between these chronological ages. This effect surpasses the impact of poor nutrition alone.

The findings relating to attachment in these children indicate that there may be different etiological factors from those associated with neurological abnormality in the genesis of impaired emotionality. Unlike cognitive impairment, disorders of attachment were found to stem from a *specific* aspect of institutional care rather than gross pervasive experiential deprivation. Regarding psychosocial development, it was the lack of *personalised caregiving* that was found to be the damaging factor in attachment formation. Reactive Attachment Disorder is a failure to develop *selective* attachment to a main primary caregiver which differs in quality from the child's emotional relationships with other adults (APA, 1994). This was repeatedly observed in Romanian orphans (Rutter & O'Connor, 2004).

Taken together, there is clear evidence for the necessity of early stimulation to social, emotional and neurocognitive development from within the containment of the primary caregiving relationship. Together with an adequately stimulating environment filled with social interaction, a personalised caregiving environment with a continuous infant-parent attachment relationship is important, both to early emotional adjustment and later neurological and socio-emotional outcomes including the development of psychological resilience. Chapter 2 will elucidate the role of the caregiver in detail.

Chapter 2: Early Infant Caregiving Capacity

Parenting is the foundation from which all humans grow. The quality of this foundation tends to vary from parent to parent, and this contributes to other factors which determine individual differences between infants. As outlined in Chapter 1, the nature and quality of early maternal care exacts consequences that resonate through the infant's lifespan. Beginning in gestation, neurological pathways that influence emotional, cognitive, social and physical development are laid down within the context of the first caregiving relationship. Major interruptions to early infant care can bear pervasive effects upon later life functioning through insult to developmental processes.

This chapter will define the parenting role in the context of raising a new infant. In defining and delimiting this important human construct, the groundwork will be laid for Chapter 3, where the effects of schizophrenia upon maternal role functioning will be discussed. Chapter 2 will begin with a definition of parenting capacity, followed by a detailed description the infant caregiving role in terms of its instrumental and emotional components.

Parenting Capacity

'Parenting capacity' refers to the ability of an individual to carry out the core tasks associated with raising a child. This is influenced by the factors surrounding the parent that create the parenting context, characteristics of the child, and ability of the community to facilitate the mother in her role (Reder, 2003). Within *The Framework for Assessment of Children in Need and their Families* (Department of Health, 2000), parenting capacity is defined as the ability to provide basic care, safety, emotional warmth, stimulation, guidance, boundaries, and stability to the child. During the postpartum period, parenting capacity refers to the ability to provide the infant with appropriate instrumental and emotional care within a trusting mother-infant relationship.

Parenting an early infant

As elucidated in Chapter 1, the new infant's primary developmental milestones are vital in laying the early foundations of emotion regulation, stress resilience, physical, behavioural and cognitive advancement, and interpersonal socialisation. Winnicott recognised that it is not possible for an infant to develop in isolation, saying:

"... If you set out to describe a baby, you will find you are describing a baby and someone." (Winnicott, 1978, p.88)

Both the parent and infant have roles to play in the developmental journey of an infant. The parent's role in infancy is to provide physical holding (Winnicott, 1965) and emotional containment (Bion, 1962a) for the infant's developing mind. Equally intrinsic is the provision of a reliable, predictable, and secure base for attachment in the service of survival and comfort. Physical survival and maturation are supported by practical caregiving, protection, and the support of a caregiver. Emotional development is supported by emotional input from the mother including sensitivity, warmth, empathy, interaction, mentalisation and reflective capacity.

Sroufe (1996) describes a series of stage-like developmental 'issues' that are accompanied by requirements of the caregiver. Table 1 depicts the first four of eight proposed stages that span from birth into the child's adolescence.

Table 1. Sroufe's Issues of Development: Stages 1-4 (the first year) (adapted from Sroufe, 1996).

Period	Age	Issue	Role for caregiver
1	0-3 months	Physiological regulation	Smooth routines
2	3-6 months	Management of tension	Sensitive, cooperative interaction
3	6-12 months	Establishing an effective attachment relationship	Responsive availability
4	12-18 months	Exploration and mastery	Secure base

In Sroufe's depiction of the first developmental year, the parenting role is defined by the needs of the infant, and both change with regularity in accordance with maturational progression. In considering the needs of an infant in Chapter 1, we have started the task of understanding what is involved in the early caregiving role. This section will continue on from the previous chapter by detailing the early caregiving role. Information was compiled from the scientific literature and my in situ observation of the sample (51 postpartum mother-infant dyads) as they functioned in their daily routine.

Early caregiving in detail

Early caregiving is comprised of a diverse spectrum of behaviours. The literature delineates two domains of caregiving that influence infant development. *Instrumental* care describes behaviours that promote safety, consistency and material adequacy of the early nurturing environment. *Emotional* care involves aspects of parenting that promote psychological (emotional and cognitive) development. The bulk of the literature on infant caregiving describes emotional skills to the exclusion of instrumental care. Here, the role will be defined in full with regard to its instrumental and emotional components.

Instrumental Caregiving

While the infant adjusts to the extrauterine environment, a great deal of early instrumental care is required to support the re-establishment of homeostasis. Instrumental care scaffolds the infant's acquisition of rhythmic cycles such as feeding, sleeping and waking (Zeanah, 1997)

Studies with rodents tend to index instrumental nurturance in terms of the frequency with which pups are licked and groomed by their mothers. This research demonstrates significant effects of instrumental caregiving on the functional and structural neurobiology of the pups, particularly regarding their developing memory and stress-response systems. Overall, there is a consensus that higher quality pup care results in better neurological and behavioural outcomes in adulthood. In a study by Bagot and colleagues, the quality of maternal care (i.e. the quantity of licking and grooming) was seen to affect hippocampal function and cognitive performance through epigenetic regulation of genes involved in glutamatergic signalling (Bagot et al., 2012). Pups that had been licked and groomed more frequently by their mothers demonstrated superior performance on tests of learning and memory (relating to hippocampal functioning). The longitudinal findings of Hellstrom and colleagues (Hellstrom, Dhir, Diorio, & Meaney, 2012) demonstrate that there is a lasting effect of maternal licking and grooming upon HPA stress responsivity. More frequently groomed rat pups showed increased hippocampal glucocorticoid receptor expression and lower-intensity pituitary-adrenal response to stress during adulthood. In a review linking rodent and human findings together, better infant care predicted increased hippocampal glucocorticoid receptor expression and lower HPA over-activation during stress in both species (Zhang, Labonte, Wen, Turecki, & Meaney, 2013). The rodent and human studies combine to suggest an important relationship between early instrumental caregiving and later outcomes of the infant. Instrumental care for human infants involves protection from harm and illness, providing for basic needs, being diligent in the role and competent in performing the tasks in a focused, planful and adaptable way. The dimensions of instrumental care are described as follows.

Protection

A key aspect of caregiving involves the provision of physical safety. The infant requires protection against illness, infection and other forms of harm (Reder, 2003). Some examples of protective caregiving behaviours include testing the water temperature prior to placing the infant in a bath, ensuring that formula milk is not overheated, keeping the infant's body warm during and after bathing, wiping from front to back during nappy changes to guard against urinary tract infections, supporting the head and neck during handling, and attending to the baby on raised surfaces (such as the change table).

Between 2002 and 2004, statistics relating to infant injury and mortality in Australia (ABS, 2004) revealed that on average, there were 1200 deaths per year in infants under 12 months of age. Of recorded childhood deaths, most (68% in 2004) were found to occur in the first year of life. Other Australian data indicate that between 1999 and 2003, accidental drowning accounted for 19% of all child injury deaths (286 children) (ABS, 2006). For infants under 12 months, 13% of injury-related deaths were due to accidental drowning, while 41% were caused by other accidental threats to breathing (ABS, 2005). The most common location of infant drowning was in the bath (this was found in 62% of children under 12 months) (ABS, 2006).These findings highlight the importance of *protection* in early caregiving capacity, particularly during the infant's first year.

Provision

Hoghughi (1997) points out that in addition to skill, material and personal resources are required in order to adequately care of an infant. The infant has many physical needs such as clothing, formula (if bottle-feeding), warm water and shelter. The parent is required to provide for these needs with the help of the wider community. Low family financial resources is observed to cause depression and reduced optimism in parents (Brody et al., 1994). After controlling for maternal age, race and related psychosocial variables, financial hardship is has been widely observed to relate to raised neonatal mortality (Ericson, Eriksson, Kallen, & Zetterstrom, 1990; Mayer & Sarin, 2005; Oakley, Maconochie, Doyle, Dattani, & Moser, 2009).

Diligence

It is common for mothers to lack skill while adjusting to the caregiving role. The dyad includes a developing *mother* as well as a growing infant. Through diligent practice, the mother develops necessary skill in her role. Initially limited proficiency with certain caregiving skills can be countered by a commitment to ‘getting things right’ (i.e. *diligence*). This dimension can be defined in terms of the mother’s level of commitment, effort, and dedication throughout task completion. Although unable to ‘burp’ her baby at first, for example, a diligent mother will persevere with the task in an effort to acquire this ability. A mother with strength in this area of her parenting will be likely to respond well to intervention that is targeted at areas in which she is limited. In such a way, diligence in the caregiving role will enhance the propensity for sound outcomes.

Competence

Competence refers to a caregiver's knowledge and ability in relation to the parenting role (Hoghughi, 1997). Handling to prevent dropping requires an element of skill, as does dressing, fastening a nappy, and preparing a bottle. In the absence of maternal proficiency, a practical approach to intervention is required.

Focus

Focus refers to task-related attenuation and in particular, the ability to remain centred on the infant. The mother who disturbs feeding by becoming distracted and talking loudly on the phone, or who repeatedly turns her back while the baby is on the change-table, will require intervention that targets her ability to concentrate and remain vigilant to caregiving events. Focus also refers to the mother's ability to maintain awareness of the infant and task as a whole rather than becoming preoccupied with small aspects within sub-tasks. While a mother may be very focused on applying nappy cream, for example, she may forget that the infant also desires emotional engagement and perhaps a cold tummy to be covered. In this instance, although attenuation to applying cream is very high, the mothers overall level of focus would be considered low.

Planning

Preparatory behaviours such as laying out clean clothing prior to bathing the infant help to guard against hazardous situations such as doing so afterwards (with a wet baby in tow). As well as promoting safety and assisting in the smooth running of tasks, planning behaviours limit the infant's homeostatic dysregulation, supporting his or her ability to attend to the environment and learn. An infant's safety and enjoyment throughout the caregiving experience are enhanced by maternal planning behaviours. Additionally, a mother's emotional state during caregiving will more likely be stable where chaos is reduced through adequate planning.

Holding

Competent handling and physical control are important aspects of early infant caregiving. Coordination and control throughout caregiving can help to facilitate a safe and reassuring experience. This in turn contributes to the emotional quality of caregiving, promoting trust and security within the infant (Winnicott, 1965). Poor holding may be exhibited by the mother whose baby slips under the water during a bath, or is jolted about awkwardly during dressing. Competent physical management allows the baby to be cared for in a way that is safe and minimally dysregulating.

Precision

Precision is required in completing aspects of care such as fastening a jumpsuit such that buttons match up, fastening a nappy correctly, applying creams to the right skin regions, achieving good latching prior breastfeeding, and preparing a bath of the right temperature and depth. If, for example, a bath is too cool, the infant will be uncomfortable and susceptible to illness. If too hot, the infant's skin may be damaged. Where formula is not accurately mixed, as another example, the milk may be difficult to digest, causing pain for the infant. Precision during caregiving is thus important.

Another element of caregiving *precision* involves correct sequencing of subtasks. An example of precise sequencing involves placing a front-buttoning growsuit on the change table beneath the baby prior to laying him down during dressing. Repeated rolling and lifting can be minimised in this way. Correct sequencing also helps when changing a nappy.

Cleaning the baby before the next nappy is unfolded and re-positioned ensures that the new nappy remains clean and dry.

Adaptability

Parents require *adaptability* to meet the evolving requirements of their infants as they mature (Azar & Cote, 2002). In order to be adaptable, a parent must be perceptive of what is happening, responsive to situational needs, and flexible in approaching each need during caregiving (DoCS, 2005).

In the behavioural and time-limited context of infant caregiving, *adaptability* is reflected in behaviours such as re-cleaning a baby who soils a nappy while being dressed. A mother low in adaptability may continue to fasten the nappy without perceiving what has happened responding appropriately before continuing. Another example of low adaptability involves undertaking caregiving tasks in predetermined order, despite an obvious benefit in reordering the tasks due to situational needs on the day. This may be exemplified where a mother does not feed her infant until after she bathes him, despite obvious hunger signals beforehand. Examples of high adaptability in the early caregiving role include changing the pre-planned outfit in response to a hot day, or shortening the routine of dressing where an infant is unsettled.

Maternal self-efficacy

Maternal self-efficacy describes a mother's belief in her ability to organise and carry out the tasks involved in caring for and raising her child (Bryanton, 2008; de Montigny, 2005; Kendall, 2005). Maternal self-efficacy contributes to positive parenting practices and sound child development {(Teti & Gelfand, 1991). In the context of infant caregiving, this has been found to translate to higher maternal warmth, sensitivity and responsivity (Teti &

Candelaria, 2002). Higher maternal self-efficacy is demonstrated by a mother who is able to complete caregiving tasks in a self-directed way. In contrast, a mother who appears unable to complete tasks independently without encouragement and/or assistance may have lower capacity on this dimension.

Taken together, instrumental caregiving draws on a combination of capacities, including cognition for attention, flexibility, and planning behaviours, knowledge of the role and the needs of the infant, and fine and gross motor skills. Instrumental caregiving is complex and varied and as such, requires definition when describing infant caregiving.

Emotional Caregiving

As covered in detail within the previous chapter, sensitive emotional caregiving supports the infant's neurobiological development. Through application of adequate emotional capacities, the mother helps to reinforce an infant's developing neural circuits. Circuits that regulate reward, fear, emotion reactivity and social behaviour are thought to influence later resilience (Feder, 2009). The dimensions of emotional caregiving discussed within the following section include emotion regulation, attributional style, affection, interaction, empathy and mentalisation.

Emotion Regulation

While transitioning to life outside of the womb, internal homeostasis is a priority for the early infant. The mother participates in dyadic regulation by perceiving and buffering against states that the infant cannot manage alone. In the presence of jarring noises or excessive temperatures, for example, the caregiver demonstrates the function of *emotion regulation* by adjusting the situation to a sensory level that is within the infant's capacity to tolerate. By providing an appropriate balance between soothing and stimulation, the caregiver high in *emotion regulation* models a framework for the infant to gradually accomplish *self*-regulation (Sroufe, 1996).

The infant will indicate disturbed homeostasis when feeling physically, emotionally or cognitively overwhelmed. The caregiver can work towards state modulation by perceiving and responding to behavioural signs of distress that overlay difficult affects. Without the faculty of verbalisation, the new infant is left with communicative gestures, or 'cues', to communicate unmanageable states (such as hunger, pain, and illness). Emotion perception through sensitivity to these behavioural cues forms an essential part in modulating dysregulation. The requirement of the mother to perceive disturbed states and implement behaviours to alleviate them draws heavily upon social cognition. Stern (1985) referred to maternal behaviours that facilitate infant homeostasis as 'attunement' and 'matching'. Regarding the same function, Bion (1962a) spoke of 'containment', while Winnicott (1965) stressed the importance of the 'holding' environment.

Crucial to the holding environment is the mother's ability to tolerate her infant's distress. Remaining sensitive during these times has been shown to contribute to attachment security. Much research into maternal sensitivity and its relation to infant outcomes has been conducted by Esther Leerkes and her colleagues (Leerkes, 2010, 2011; Leerkes, Nayena Blankson, & O'Brien, 2009; Leerkes, Parade, & Gudmundson, 2011; Leerkes & Siepak, 2006; Leerkes et al., 2015; Leerkes, Weaver, & O'Brien, 2012; Leerkes & Wong, 2012). This group found that when maternal sensitivity during non-arousing play vs during infant distress were examined for significance as predictors of attachment security, only sensitivity during distress was relevant to subsequent attachment formation (Leerkes, 2011). Specifically here, it was found that maternal anxiety in response to infant crying predicted resistant infant behaviours, while maternal anger in response to infant crying predicted punitive and minimizing responses to infant distress, which in turn related to avoidant infant behaviours (Leerkes et al., 2011). Additionally, maternal sensitivity to distress but not to non-distress at 6 months postpartum was related to fewer child behaviour problems and higher social competence at 24 and 36 months of age (Leerkes et al., 2009). The sub-capacity of *emotion regulation*, then, needs to be present not just during casual interaction but importantly, during those inevitable moments of discord, distress and discomfort during caregiving in order to benefit the infant.

In addition to ensuring that the infant remains settled, maternal *emotion regulation* has been shown to hold benefits for learning and development. As demonstrated by Greenspan (1989), new infants can only be receptive to learning-based stimuli when their homeostatic balance is regulated. The importance of maternal *emotion regulation* in infant cognitive development is substantiated in subsequent research (Schore, 1996; Sroufe, 1996).

Attributional Style

Often things go wrong when providing care to an infant. Feeding may not come easily, or soothing may be difficult in association with infant temperament. Of interest here is the mother's belief about the *cause* of these difficulties, or her parenting-related *attributional style*. Some mothers attribute fault to the infant, whereas others put difficulties down to situational happenstance, or their own limitations. In terms of early caregiving behaviour, the following example will highlight differing loci of negative attribution. During bathing, it is common for infants to cry when water is spilled over their face. One mother may say "Oh you silly thing! You moved and now you have water in your eyes!" Another mother may attribute the accident to happenstance, saying "Oops, the water went in your eyes!" And yet another might say "Oh, silly Mummy! Now you have water in your eyes, I'm sorry." The first reaction involved the infant being held responsible for the negative event. In the third reaction on the other hand, the infant was not held responsible for the event, and the mother communicated regret. In the context of infant caregiving, adverse events may include any incident that is adverse, slightly annoying, difficult or inconvenient, such as the inability to get a limb into a growsuit while dressing, or an especially dirty nappy.

Parental cognitions and their effect on dyadic interaction are discussed in the developmental literature (Cicchetti, 1995; Sigel, 1996). Abusive parenting is characterised by a tendency to attribute malevolent intent to the child (Cicchetti, 1995; Sigel, 1996). As highlighted by Kaye (Kaye, 1980a, 1980b), the infant's early resemblance to the physical adult can create a tendency in some mothers to attribute him or her with intent that is developmentally inappropriate. It has long been thought that attributions around child behaviours bear an influence upon the disciplinary style of the caregiver (Dix, 1985).

Mood-disordered mothers are a clinical group where attributional style can be problematic. These mothers at times exhibit attributions regarding their children's emotions are more negative in tone than other groups (Radke-Yarrow, 1990). This negative attributional style in depression has been found to account in part for the higher rate of insecure attachment within the cohort (Cicchetti, 1995).

Affection

Although frequently neglected in mother-infant assessment, affection forms a central component in determining caregiving capacity. From the earliest weeks, infants are capable of affect discrimination (Ekman, Friesen & Ellsworth, 1972; Lamb et al., 2002). Emotional contagion exists at birth for most infants, becoming less automatic with maturity. This early conductivity renders affection essential to postpartum caregiving capacity (Ekman, Friesen & Ellsworth, 1972; Lamb et al., 2002). It is noted in research relating to resilience (reviewed in Feder, 2009) that positive emotions relate to greater flexibility of thinking and exploration, a broadened focus of attention and decreased autonomic activity (Fredrickson, 2001), together with better cognitive control of emotion (Goldin, McRae, Ramel, & Gross, 2008; Ochsner et al., 2004).

Consequences of inadequate maternal affection can be found in the literature relating to maternal depression. Infants of depressed mothers who are lower in affection are known to exhibit reduced activity in the 'enjoyment' frontal region, with maternal emotional tone accounting for this difference relative to the infants of healthy controls (Nash, 1997). Mother-infant affective exchanges are significant in the development of a healthy infant brain, and should thus always be targeted in assessment and intervention.

Interaction

While at birth the infant's brain is sophisticated in structure, functional maturity occurs over time and in the context of social stimulation (Sroufe, 1996). Social stimulation (gestural, verbal, tactile and visual) promotes the reinforcement of synaptic pathways required for productive communication and emotional capacities (see Chapter 1 for review). Contingent responding to communications of the infant reinforce the infant's sense of social effectance (Lamb et al., 2002). By contrast, problem behaviours are found to emerge in toddlerhood following a history of unresponsive interactions (Moore, Cohn, & Campbell, 2001).

Mother-infant interaction occurs in many sensory modalities. By returning babbling with sounds her own, the mother encourages speech production and provides opportunities for the infant to practice conversational turn-taking. Eye-contact and mutual attention help the infant to feel acknowledged and included in the social environment. For the preverbal infant, eye contact is a rich source of information about the feelings and intent of another (Oyama, 2004). Touch is reassuring and communicative in its own way, conveying love, protection and holding. Interaction via touch is not always measured by assessments of mother-infant interaction. Prior to birth, touch is the primary means of dyadic communication, and it retains its significance throughout infancy (Brazelton, 1993).

Empathy

Empathy refers to the mother's active concern for the subjective experience of her infant. An infant who has been cared for with respect and sensitivity will anticipate encounters outside of the dyad that are equally positive and rewarding. The infant's own acquisition of empathy is scaffolded by the mother's early modelling within the caregiving relationship (Donald, 2004; Oyama, 2004). Maternal empathy has been found to exhibit reparative effects upon attachments classified as anxious prior to intervention (Lieberman, 1997). This suggests that empathy is a dimension of caregiving capacity that should be evaluated and targeted early on.

A mother high in empathy will attempt to avoid her baby's face when washing the hair during a bath. Other empathic behaviours include gentle handling and infant-led feeding. A less empathic mother may be more objective in her handling, appearing unconcerned with (or unaware of) the infant's subjective experience. Behaviours such as pulling the infant from the breast during active feeding, or repeatedly force-feeding despite signals of protest, are examples of less empathic caregiving behaviour.

Mindedness

This caregiving dimension has been named *mindedness* to indicate origination in the work of Elizabeth Meins and colleagues surrounding mind-mindedness (Meins, Fernyhough, Fradley & Tuckey, 2001; Meins, Fernyhough, Wainwright, Clark-Carter, Das Gupta, Fradley & Tuckey, 2003; Meins, Fernyhough, Wainwright, Das Gupta, Fradley & Tuckey, 2002). Mind-mindedness refers to the mother's ability to describe her preverbal infant's mental experiences in an accurate and appropriate way. By commenting appropriately on her infant's thoughts, desires, intentions and memories, the mother is "communicating understanding of her child's intentional stance" through correct representation of his or her mental experience (Fonagy & Target, 1997, p. 679). This dimension of early caregiving capacity is delineated in the works of Slade (2005), Fonagy (1997), and Meins and colleagues (2003). Fonagy's work on reflective capacity and mentalisation together with Meins' research on maternal mind-mindedness have culminated to demonstrate the importance of these capacities in healthy development of attachment security, emotion regulation, and later reflective functioning. Cross-sectionally, Meins et.al. (Meins, Fernyhough, Russell & Clark-Carter, 1998) found secure attachment to be more likely in infants whose mothers focussed on their mentalistic attributes. Longitudinally, Meins (2002) found security to be more likely in childhood following appropriate maternal mind-mindedness during infancy.

Beyond attachment security, maternal mind-mindedness during the first year of life can predict a child's theory of mind at three years of age (Meins et al., 2002). These findings show that it is specifically early maternal mind-mindedness (versus sensitivity and broader mother-infant interaction) that influences theory of mind. The importance of cultivating this capacity during infancy is highlighted by findings that implicate impaired mentalisation in the genesis of later psychiatric disorder (Fonagy, Steele, Leigh, Kennedy, Mattoon & Target, 1995). Through early identification of impaired maternal 'mindedness', we have the ability to isolate an area of limitation that is known to create psychiatric vulnerability.

At the beginning of infancy, emotional caregiving functions primarily by supporting the postpartum continuation of early neurological development. Through adequate emotional caregiving, mothers provide their infants with the necessary stimulation to develop language, reflectiveness, interpersonal relatedness, and the beginnings emotion regulation.

Summary

This chapter has undertaken the task of defining parenting capacity in the context of early infant caregiving. The literature relating to this subject is vast and disjointed, so an aim of this section was to tie together the essential aspects of early infant caregiving into one central place of reference. The detail included here is specific to the needs of very young infants, and is summarised in Table 2.

Table 2. Summary of components of infant caregiving capacity, as informed by the literature and empirical observation.

Instrumental Dimensions	Description
Protection	Safety, harm minimisation, hygiene and health-promoting behaviours.
Provision	Meeting basic material needs required to bathe, clothe, dress, feed, and shelter new infant.
Diligence	Effort, conscientiousness, thoroughness, commitment to task completion.
Competence	Skill, knowledge, ability.
Focus	Task-oriented attenuation, vigilance.
Planning	Task-related planning and preparation.
Holding	Physical handling & control.
Precision	Accuracy & sequencing.
Adaptability	Responsivity & flexibility.
Maternal Self-efficacy	Task-specific confidence, initiative & autonomy.

Emotional Dimensions	Description
Emotion regulation	Soothing, settling, buffering, tempering of arousal, affective attunement.
Attributional style	Extent to which infant is held accountable for adverse events during task completion, as indicated verbally by mother.
Affection	Warmth, mood, tone.
Interaction	Adequacy and contingency of social stimulation & communication with infant.
Empathy	Concern for subjective experience of the infant; extent to which caregiving is gentle, child-centred, considerate.
Mindedness	Understanding of infant's experiential & intentional stance, evidenced in mother's correct/appropriate verbalisation(s) of her infant's mental experience.

Infant outcomes including cognitive, language and motor developmental milestones, together with emotional regulation and resilience to stress are all influenced by the earliest caregiving relationship. This is not to say that parenting needs to be perfect for adequate outcomes, in fact, 'good enough' parenting is ideal (Winnicott, 1965). For self-regulatory capacities to develop in infancy, the frustration of partially (versus fully) met needs provides the impetus necessary for growth. Sound maternal care is that which provides the infant with developmentally appropriate exposure to challenge, together with sufficient physical and emotional nurturance to render this frustration tolerable.

Chapter 3: Parenting with Schizophrenia

Motherhood is a challenging role and a life-changing experience for women. Even with the best preparations in place, many find themselves overwhelmed. With the typically limited financial and social resources of people with schizophrenia, and in the context of massive physiological stress, a major life event such as childbirth can very easily precipitate relapse. Clinical management can be complicated, particularly when many routine psychotropic medications are contraindicated in pregnancy due to teratogenic risk to the foetus and the transmission to the infant during breastfeeding.

Deinstitutionalisation and community care has resulted in a burgeoning of fertility among women with psychotic disorders (Jablensky, McGrath, Herrman, Castle, Gureje, Morgan & Korten, 1999). This has been influenced by the introduction of new antipsychotics that provide an alternative to first generation antispychotics, which inhibited fertility through hyperprolactinaemia (Castle, 2000). The rise in fertility among women with schizophrenia has been accompanied by a visibly higher incidence of child protection concerns in relation to this cohort and in turn, a growing body of research into links between the illness and poor infant outcomes (Howard, 2005).

While women with schizophrenia are less likely than other women to bear children, many do become mothers. Low socio-economic status, limited social support, debilitating symptoms, and medication and their adverse effects all contribute to difficulty in providing the level of care that is needed for sound infant development. Around half of the infants of this vulnerable group are removed in the time that follows childbirth (Glangeaud-Freudenthal et al., 2013; Hipwell & Kumar, 1996; Howard, Shah, Salmon & Appleby, 2003; Howard, Thornicroft, Salmon & Appleby, 2004 ; Joseph, Joshi, Lewin & Abrams, 1999; Kumar, Marks & Yoshhida, 1995; Miller & Finnerty, 1996; Salmon, Abel, Cordingley, Friedman & Appleby, 2003; Whitmore, 2011). Similar rates of removal have been recorded among community samples within the US (Miller & Finnerty, 1996), while in the UK, removal rates among mothers with schizophrenia in the community are around 25% (Howard, Goss, Leese, Appleby & Thornicroft, 2004). Illness-related factors such as symptoms, poor support networks and chaotic lifestyle patterns can detract from safety and appropriateness of the early caregiving environment (Kumar, Marks, Platz & Yoshida, 1995). Mothers with schizophrenia are significantly overrepresented in child protection proceedings, relative to the population prevalence estimate for psychiatric illness (Howard et al., 2003). In a study exploring the experiences of mothers with schizophrenia, Dipple (2002) found the majority of participants had been hospitalised in relation to schizophrenia and other psychotic illnesses. Of these mothers, 68% had been permanently separated from at least one of their children. Many mothers had been separated against their wishes from their children and continued to express sadness and frustration in relation to the separations several years after they had occurred (Dipple, 2002).

Data from a large multi-centre research study have shown a diagnosis of schizophrenia to be independently associated with a heightened risk for social services supervision and/or separation following discharge from joint mother-baby units (Howard et al., 2003). A later multi-centre study showed that in addition to a diagnosis of schizophrenia, other factors contributing to separation at discharge included infant health complications, paternal psychiatric disorder, poor maternal relationships, disability benefits, and low socioeconomic status (Glangeaud-Freudenthal et al., 2013).

While it is true that mothers with schizophrenia present with many risk factors for their infants, outcome studies show that child-removal is rarely a lasting solution in guarding against longer-term risk (McConnell, 2006; Stock, 2006). Outcomes following disturbed attachment in infancy include diminished brain volume in toddlerhood, difficulty socialising in childhood, and compromised psychiatric health in adolescence and later maturity (see

Chapter 1 for review). It is often the case that while psychotic symptoms can be florid following parturition, this brief and time-limited period of illness does not resemble the more typical symptom profile of most mothers. While the longitudinal effects of maternal psychiatric illness upon the wellbeing of children can be marked, the majority of parents with a psychiatric illness are able to care for their children adequately when they are provided with appropriate support (Miller & Finnerty, 1996; Scott, 1995). The following chapter is dedicated to examining early caregiving in the context of schizophrenia.

Schizophrenia: An Overview

Schizophrenia is characterised by positive and negative symptoms, cognitive deficits, disorganisation in both behaviour and thought, formal thought disorder and psychosocial difficulties. It is also frequently accompanied by prominent mood and anxiety symptoms. This illness carries a heavy burden of disability with regard to social and occupational functioning. Schizophrenia has an incidence of 0.16 - 0.42/1000, and a lifetime morbid risk of 0.72% (Saha, Chant, Welham, & McGrath, 2005). It has its peak onset between late adolescence and early adulthood, and is slightly more common among men. While onset in men tends to peak at around 20-25 years of age, the onset peak is later in women, at around 25-30 years of age. There is a second, smaller peak of illness-onset in women after 45 years of age (Figure 6).

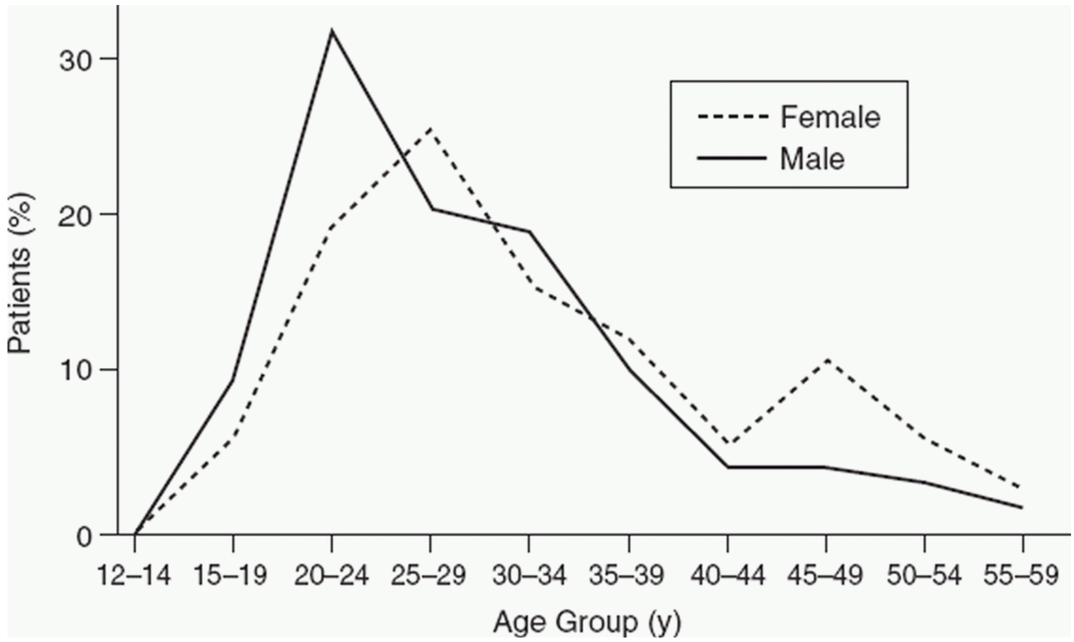

Figure 6. Age at onset distribution in schizophrenia (adapted from Gur et al., 2005).

The twin-peaked distribution of onset age in women has been explained by what is widely known as the oestrogen protection hypothesis, wherein it is thought that women are to some extent protected by their higher levels of endogenous oestrogen. In association with the oestrogen protection hypothesis, it is believed that schizophrenia may have a significant hormonal aetiological component, with the loss of oestrogen-mediated protection around perimenopause accounting for the second peak of illness onset in women (Kulkarni, Gavrilidis, Hayes, Heaton, & Worsley, 2012; Kulkarni, Hayes, & Gavrilidis, 2012; Riecher-Rossler & Hafner, 1993).

Although not complete, our knowledge around the causes of schizophrenia has advanced over time, with morbidity found to occur in relation to genetic predisposition, prenatal infection or stress such as starvation, obstetric complications, early environmental stress, organic disease and substance misuse (Sullivan, 2005). The significance of prenatal infection and obstetric complications as potent risk factors (Figure 7) points to a likely neurodevelopmental cause for the illness. There is evidence linking the disorder to genes that are active in neurotransmission, neural development and neurological structures (Lee et al., 2012; Sullivan, Daly & O'Donovan, 2012). It is clear that more than one group of neurotransmitters is involved, and that the expression of the disease is to a significant extent influenced by environmental factors (van Os, Kenis, & Rutten, 2010). As can be seen, a family history of schizophrenia is the single greatest risk factor for morbidity. It is thought that the presence of genetic risk heightens sensitivity to other developmental and environmental risk factors (Brennan, Harris, & Williams, 2013).

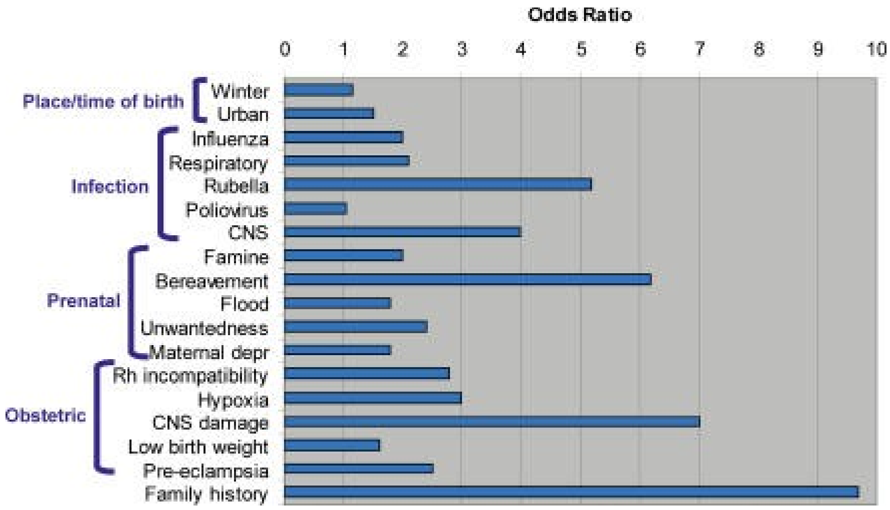

Figure 7. Comparison of established risk factors for schizophrenia (adapted from Sullivan, 2005).

Prognosis in schizophrenia is predicted by gender, marital status, age at onset, premorbid functioning, and duration of undiagnosed psychosis. Medication adherence, social support, daily functioning and self-efficacy are protective in illness course and outcomes.

A conceptual model of schizophrenia

Harris and colleagues have recently put forth a model in which schizophrenia is conceptualised in terms of five symptom-related domains including *positive symptoms*, *negative symptoms*, *excitation and disorganisation*, *cognitive deficits*, and *affective symptoms* (Harris et al., 2013; Brennan et al., 2013).

Symptoms

Positive symptoms encompass the well-known symptoms of delusions and hallucinations. Hallucinations refer to perceptions in the absence of environmental stimulus. While in schizophrenia, these typically involve auditory hallucinations, each of the five sensory systems can potentially be involved. Delusions are overvalued ideas comprising false yet unshakeable beliefs, including persecutory beliefs, grandiose beliefs, ideas of reference, belief in thought control (regarding the self or others), and distortions of self-identity. Overall, positive symptoms respond well to antipsychotic medications and do not tend to cause a great deal of longer-term disability.

The *excitation and disorganisation* domain encompasses excitement, hostility, aggression and disorganisation of thought and behaviour including alogia, loose associations and a general breakdown in the organisation of language. This domain comprises the aggression and poor impulse control observed in acute psychotic episodes, together with the disorders of thought that characterise the illness in general. As with other positive symptoms, symptoms under the Excitation and Disorganisation domain respond reasonably well to medication.

Negative symptoms describe lost emotional, social and motivatory functions, cognitive and motoric slowing, and impoverished thought. Negative symptoms include blunted affect, emotional withdrawal, poor rapport, difficulty in abstract thinking, lack of conversational flow, stereotyped thinking and passive social withdrawal (Kay, Fiszbein, & Opler, 1987). These symptoms respond less well to medication and are important when considering prognosis (Brennan et al., 2013).

Kraepelin's dichotomy between the psychotic and affective illnesses implies that schizophrenia is a disorder of cognition rather than a one of emotionality and as such, contains a pronounced neurological component. *Cognitive symptoms* greatly inhibit the ability of people with schizophrenia to maintain work, form relationships and socialise. A widely accepted finding within the schizophrenia literature is that this cognitive aspect of the illness is distinct and separable from psychotic symptomatology (Fitzgerald et al., 2004; Sergi et al., 2007). The neurocognitive deficits associated with schizophrenia include impaired attention, concentration, memory, executive functioning, processing speed, and social cognition (Barch et al., 2009; Heinrichs & Zakzanis, 1998; Nuechterlein, 2004; Kern, 2011; Bell et al., 2013; Sergi et al., 2007; Williams et al., 2008). Social cognition refers to a subset of cognitive abilities that are essential in community functioning including inferring, recognizing and empathising with the intentional and emotional states of others.

The cognitive deficits associated with schizophrenia have been found to predate the onset of illness, deteriorate at the time of first presentation, and then stabilise thereafter (Brennan, Harris & Williams, 2013; Mesholam-Gately et al., 2009). These deficits are largely resistant to medication, however there are recent findings supporting the efficacy of cognitive remediation, an educational approach to treating deficits (Keefe et al., 2011; Wykes et al., 2011). When combined with other psychosocial approaches, cognitive remediation has been shown to the enhance community function of people with schizophrenia (Wykes et al., 2011; Kurtz & Richardson, 2012). In view of the significant proportion of disability in schizophrenia that is attributable to cognitive deficits, the combination of psychosocial interventions is considered a promising mode of treatment.

Affective symptoms regularly form part of the clinical picture in schizophrenia. This domain describes emotional symptoms such as anxiety, depression, and in cases of schizoaffective disorder, discrete episodes of mania. Depressed mood forms part of the natural course of recovery from a psychotic episode, with approximately two-thirds of sufferers having a depressive episode linked to their first case of psychosis (Addington, Addington & Patten, 1998). Anxiety is also prevalent in schizophrenia, with approximately

40% of sufferers also satisfying criteria for a comorbid anxiety disorder. Affective symptoms can be treated with psychotherapy and psychotropic medication (Cosoff, 1998).

Functioning

People living with schizophrenia encounter multiple adversities that can affect quality of life and everyday community functioning. In a nationwide epidemiological survey of people with schizophrenia (Morgan et al., 2011), it was found that almost one in five (18.4%) sufferers experienced difficulty with basic literacy. Only a third of sufferers had completed year 12 education (31.2%) and a similar proportion (30.5%) reported having been in paid employment over the previous year. As a group, they remain overwhelmingly dependent upon government benefits (85%). Only 13.1 % were found to have owned their home, with a similar proportion (12.8%) having experienced homelessness at some stage over the past year. Around one-third (37.4%) of respondents had received help from the State department of housing over the past year. Regarding community and social functioning, this population remains isolated with nearly 70% not attending any recreational activities and two-thirds (63.2%) reporting severe social dysfunction. Findings show that without social support, almost half of sufferers (43.6%) are not able to maintain role performance across the domains of home, work and study. Around a third of respondents were either not able, or not responsible for carrying out the activities of daily living, including tasks such as shopping, cooking, doing laundry, cleaning and paying bills. One third (32.3%) of sufferers had experienced severe impairment in self-care, and in 3.6% of respondents, this had amounted to self-neglect (Morgan et al., 2011).

Impaired insight is an important feature of schizophrenia (Figure 8) accompanying the neuropsychological component of the illness (Amador, Flaum, Andreasen, & et al., 1994). Treatment adherence and the level of impairment to family and community functioning are greatly affected by insight. Consequently, the degree of insight is a factor that greatly influences the course and prognosis of schizophrenia (Amador et al., 1994).

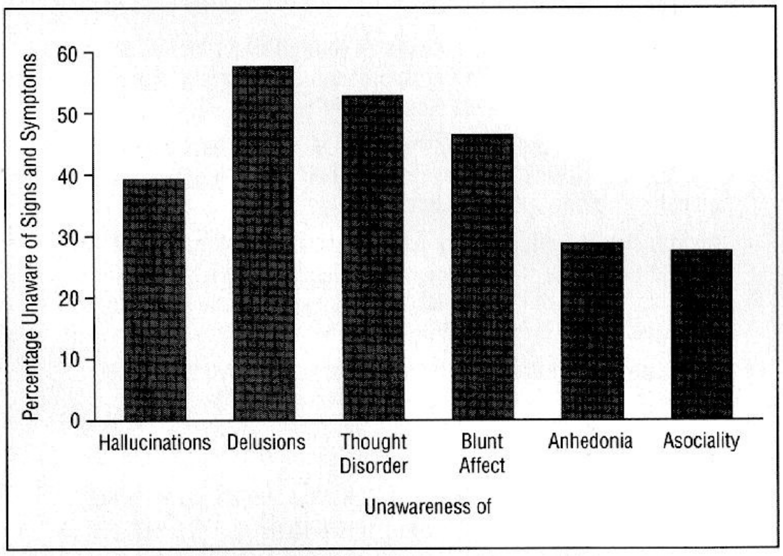

Figure 8. Prevalence of insight deficits with respect to symptoms in schizophrenia sufferers (adapted from Amador et al., 1994).

Health

Poor physical health remains a prominent feature in many who suffer from schizophrenia (Morgan et al., 2011). Australian data show that people with schizophrenia have a 2.5 fold increased risk of dying prematurely compared with other people in the community, with this gap having increased over the past decade (Saha, Chant, & McGrath, 2007). Although part of this increased mortality rate is due to an increased risk of suicide, especially in the first few years after diagnosis, the majority of the risk is due to morbidity and mortality secondary to a broad range of physical diseases. Australian data show that 4 out of 5 subjects with a psychotic illness met criteria for abdominal obesity (Morgan et al., 2011). Additionally, it was found that 28.6% had an elevated blood glucose level, and 49.9% met criteria for metabolic syndrome. The basis of the very poor health outcomes can be understood in terms of the higher rates of smoking in schizophrenia, with 66.1% reporting continued tobacco use (compared to 25.3% of the general population) (Morgan et al., 2011).

This picture is compounded by poor nutrition and high rates of sedentary lifestyle, with only 3% having moderate or high levels of physical activity compared to 27.9% of the general population (Morgan et al., 2011).

Other significant health problems relate to side-effects caused by antipsychotic medications, which are primarily dopamine antagonists. The movement disorders associated with the use of First Generation Antipsychotics (FGAs) have been reduced with the advent of Second Generation Antipsychotics (SGAs), however they do still occur and monitoring of patients for these adverse effects continues to be important in clinical management (Brennan et al., 2013).

Hyperprolactinaemia is also common among people prescribed medications that block dopamine D_2 receptors, such as amisulpride, risperidone, paliperidone and most first generation antipsychotics (Byerly, Suppes, Tran, & Baker, 2007). High levels of prolactin have immediate consequences such as menstrual cycle disturbance, galactorrhoea, gynaecomastia and sexual dysfunction. A longer-term consequence linked to increased prolactin secretion includes disturbed HPA-axis functioning in sufferers (Brennan et al., 2013).

Schizophrenia and Motherhood

Motherhood comprises a complex period of adjustment. Many ordinarily healthy mothers experience clinically significant psychiatric symptoms in association with impoverished sleep, stress and depleted energy levels following childbirth (Casiano, 1987; Kerfoot, 1981). Impaired community engagement exacerbates disability in schizophrenia, and renders motherhood especially challenging.

Mothers with schizophrenia comprise a population who present with issues that are highly significant, particularly with respect to the mental health and broader development of their infants. Women with schizophrenia demonstrate lower rates of fertility than the general population (Howard et al., 2002). Around 50-60% of women with schizophrenia bear children (McGrath, 1999). This low rate of fecundity may be a direct consequence of the illness, hospitalisation, antipsychotic-induced hyperprolactinaemia, or other psychosocial factors (specifically, difficulty with intimate relationships) (Castle, 2000; Seeman, 2004).

A major source of parenting difficulty relates to the higher rate of single motherhood that is associated with impaired interpersonal functioning in schizophrenia. Australian data show that almost 60% of sufferers lack the capacity to socialise and interact with others, with 39% unable to function in intimate relationships, and 32% in sexual relationships. The majority of mothers with schizophrenia are therefore parenting alone (Jablensky et al., 1999). Within Australia, over half (56.2%) of women affected by schizophrenia are mothers. Of these mothers, less than half (44.8%) are living with a partner (Morgan et al., 2011).

A problem related to the high rate of single parenthood in schizophrenia is severe financial hardship. Insufficient income causes difficulty with transport, daily material provisions and accommodation among mothers with schizophrenia. The majority of single mothers with schizophrenia present with housing that is inadequate or inappropriate for a baby. Single parenthood and associated financial strain can be especially problematic for mothers in NSW requiring postpartum hospitalisation. The scarcity of publicly-funded mother-baby units results in the dyad often being separated during confinement.

The antenatal environment

Schizophrenia impacts motherhood from even before the moment of conception. As with many vulnerable cohorts, there are a cluster of health risk behaviours among women with schizophrenia that also compromise the wellbeing of the foetus. These include poor diet, smoking, drinking alcohol and engaging in illicit substance use, all of which render the foetus susceptible to the effects of maternal malnutrition, toxic exposure and infections. Pregnant women with psychotic illnesses are less likely to be married, are generally less educated, and receive lower than average income (Bennedsen et al., 2001; Howard et al., 2003; Lin et al., 2010). In postpartum settings, it has been found that mothers with schizophrenia are more likely to have experienced unplanned pregnancies, sexual abuse, antenatal violence, multiple partners, and as discussed, single parenthood (Miller, 1997; Miller & Finnerty, 1996).

Health risk behaviours are in themselves usually markers of emotional vulnerability. Service providers often take a critical approach towards women exhibiting health risk behaviours in pregnancy. This negatively reinforces not only the health risk behaviours, but unfortunately, antenatal care attendance. It is common for mothers with schizophrenia to avoid services during pregnancy, particularly where there has been prior child protection involvement. Typically, mothers with schizophrenia do not present for care until much later on in pregnancy (when teratogenic medications should have been reduced or replaced). In the face of multiple adversities and potential child protection involvement, pregnant women with schizophrenia experience high levels of antenatal stress. Commonly observed complications linked to high antenatal stress include shortened gestation, placental insufficiency, restricted foetal growth, hypoxia, preterm labour and delivery (Entringer, Buss, & Wadhwa, 2010).

Infants of mothers with schizophrenia carry an increased potential for birth and developmental complications due to genetic liability, exposure to potentially teratogenic substances (both of abuse and medication) and a compromised antenatal nurturing environment. Poor service engagement spells missed opportunity for screening and identification of abnormalities and/or malformations in the foetus. Maternal schizophrenia is therefore associated with an increase in congenital malformations, stillbirth, and neonatal death, relative to the general population (Bennedsen, Mortensen, Olesen, & Henriksen, 2001; Webb et al., 2008). In association with poor antenatal care and genetic liabilty, it is common for mothers with schizophrenia to present with children who have more intensive parenting needs than the average healthy child. Increased parenting stress in association with high-needs children raises vulnerability to relapse and hospitalisation.

As a group, women with schizophrenia exhibit poor health literacy, late or inadequate antenatal care, and lifestyle factors such as smoking, drinking and poor nutrition that contribute to higher rates of pregnancy, obstetric and neonatal complications (Jablensky et al., 2005). Adverse outcomes include higher rates of placental abruption, small-for-gestational-age infants, stillbirth, neonatal death, preterm delivery, and low birth weight infants, relative to the general population (Jablensky et al., 2005; Nilsson et al., 2008; Nilsson et al., 2002; Howard et al., 2003; Lin et al., 2009). It is therefore important to invest future efforts towards more effectively addressing the clinical management of pregnant women with schizophrenia.

The infant caregiving environment

During early infant caregiving, impoverished social support in schizophrenia takes its largest toll upon mothers, who experience a diminished opportunity for practical support and respite relative to other mothers. The strain of sleep deprivation associated with night-feeding can increase the likelihood of relapse. Inappropriate housing, low financial means and a chaotic lifestyle can all impede the ability to provide for an infant at an adequate standard following childbirth. These dyads require advocacy to ensure that financial, housing and healthcare benefits are being accessed during this difficult time (Lagan, Knights, Barton, & Boyce, 2009).

The effect of clinical features upon caregiving in schizophrenia

The clinical aspects of schizophrenia that most commonly interfere with parenting include positive and negative symptoms, associated affective symptoms, and relapse-related vulnerability to high expressed emotion (Boyce, 2008; Castle, 2000; Snellen, 1999). Clinical observation shows that positive symptoms lead to chaotic behaviours that may compromise the safety of the nurturing environment. Hallucinations, delusions and disorganization can cause distraction and preoccupation (Chandra, 2006). Conceptual disorganisation may cause erratic behaviour and difficulty maintaining routines. Suspicion, hostility and delusions of persecution can impede help-seeking on behalf of the infant where it is required. The infant may be incorporated into the mother's delusional system (Chandra, 2006) and consequently, the infant can experience the mother as frightening, bizarre and even frightened at times, increasing the risk of disorganized attachment.

The negative symptoms associated with schizophrenia can impinge upon the mother's motivation, consistency, sensitivity and responsiveness during basic care and emotional interactions. Inability to be reactive to or engaged with the infant in association with the negative symptoms of schizophrenia can in extreme cases lead to neglect (Snellen, 1999). Research demonstrates that in maternal schizophrenia, remoteness and insensitivity (Riordan et al., 1999; Wan et al., 2007), elevated positive and negative symptoms (Snellen, 1999) and poor communication style linked to thought disorder (Wan, Penketh, Salmon, & Abel, 2008) are all associated with poor mother-infant interaction and poor maternal sensitivity. Understimulation during the sensitive early period can have enduring negative consequences for development (see Chapter 1 for review).

The long-established vulnerability to high expressed emotion (EE) in schizophrenia (Brown et al., 1962) poses another potent risk factor in early motherhood. At this time, infant crying and service intervention can both comprise forms of high expressed emotion (Boyce, 2008), which may exacerbate symptomatology in schizophrenia.

Another factor to be considered in the case of maternal schizophrenia relates to medication and associated side-effects (Lambert, 1998). Extrapyramidal symptoms can interfere with the fine-motor skills necessary in buttoning up a grow-suit or changing a nappy. Psychomotor slowing can make it difficult to dress an infant quickly after a bath during winter. Movement disorders interfere with gentle and confident handling required in early caregiving to promote state modulation during caregiving. In cases of schizophrenia requiring FGA use, the dosage or type of medication may need to be altered during the postpartum period, such that safe and adequate handling is possible. Sedation is another problem associated with some antipsychotic medications. Drowsiness and sedation can make it difficult for a mother to wake for feeds during the night, problematic in the case of single parenthood.

It is imperative to consider the individual symptom profile of a mother with schizophrenia and the extent to which her caregiving may be affected.

The contribution of cognitive deficits to role-related dysfunction

While reduction in positive and negative symptoms have been shown to improve the mother's parenting (Snellen, 1999), it has been demonstrated more recently that symptoms and psychosocial factors associated with schizophrenia do not adequately account for the level of parenting incapacity (Wan, Salmon, et al., 2007). It is hypothesised within the current study that illness-associated deficits to neurocognition and social cognition will independently account for impaired parenting capacity in schizophrenia.

Neurocognition

As earlier described, schizophrenia is a disorder of cognition as well as psychotic symptoms and emotional disturbance. Broad areas of deficit to attention, concentration, processing speed, memory and executive functions have been identified in people with schizophrenia (Heinrichs & Zakzanis, 1998). In line with the research associating cognitive deficits with broader daily functioning in schizophrenia (Fitzgerald et al., 2004; Green, 1996), it follows that these deficits will also account in part for the impaired infant caregiving seen in mothers with schizophrenia. Becoming a parent marks a new period of development. The process of adaptation to this occupational role requires the acquisition a novel skill-set and subsequent mastery in the real-world setting. This learning carries a high cognitive demand. It is expected that illness-related neurocognitive deficits will interfere with this learning process. The ability to understand the evolving requirements of a developing infant draws on cognitive resources of the mother. Cognitive capacity is also required for the organisational and planning behaviours required in safe and appropriate infant care. Executive functions (e.g.; planning and working memory) and social cognitions such as empathy (Donald, 2004), mentalising (Allen, 2008) and attributional style (Brunet, Sarfati, & Hardy-Bayle, 2003) play an important role in early infant caregiving.

Planning relies heavily upon executive function, an area of cognition that is impaired in schizophrenia (Green, 1996; Heinrichs & Zakzanis, 1998). Planning and problem-solving are important for safety throughout caregiving. As well as promoting safety and an easy flow of care, planning behaviours help to curtail periods of homeostatic dysregulation (such as hunger) by enhancing the smooth running of tasks (such as feeding). Safety and the subjective experience of the infant can all be enhanced by task-related planning.

Processing speed is another area of neurocognitive deficit that may inhibit many aspects of caregiving. Processing speed is required in timely decision-making and behavioural activation. Processing speed and cognitive flexibility are required to interpret and respond to time-sensitive cues of the infant, such as those that are displayed during feeding. Mothers with schizophrenia exhibit poorer cognitive adaptability (responsivity and flexibility to changing needs) than mothers from the general population. This is due to illness-related difficulties with changing cognitive set, using feedback to direct behaviour, initial conceptualization, and conceptual flexibility and abstraction (Frangou, Dakhil, Landau, & Kumari, 2006; Morice, 1996; Polgar et al., 2010). It is important to identify difficulties with caregiving adaptability when shaping intervention for a mother with schizophrenia. Impairments to sustained attention, vigilance to visual stimuli, and speed of information processing to visual and auditory stimuli may interfere with caregiving focus in schizophrenia (Hong et al., 2002; Mass, 2002). The importance of maternal focus together with this impairment in schizophrenia renders its measurement in caregiving assessment imperative.

The current study aims to discover the significance of neurocognitive deficits in accounting for the difficulties with infant caregiving commonly seen in mothers with schizophrenia. It is hypothesised that where mothers with schizophrenia experience impaired caregiving capacity, a proportion will be accounted for by neurocognitive deficits.

Social cognition

Neurocognitive deficits are found to account for 20-60% of the variance in the functional outcomes people with schizophrenia (Green & Harvey, 2014; Green & Nuechterlein, 1999; Green, 2006). This leaves up to 80% of functional impairment unaccounted for (Couture, Penn, & Roberts, 2006). Social cognition is an area of marked impairment in schizophrenia and has been an issue of clinical concern in the setting of parenting. It has already been established that impaired social cognitions impact independently upon functioning in schizophrenia (Sergi et al., 2007). Theoretical models place social cognition as a mediator in the relationship between neurocognition and function in schizophrenia (Brekke et al., 2005; Green & Nuechterlein, 1999), based on findings that social cognition mediates the effect of neurocognition on aspects of social and vocational functioning (Addington et al., 2010; Addington et al., 2006; Bell et al., 2009; Sergi et al., 2006; Toomey et al., 1997; Wynn et al., 2005). A hypothesis of the current study is that this relationship may also apply to infant caregiving capacity, such that neurocognition, through its strong impact upon social cognition, affects caregiving capacity *indirectly*. The social cognitions that are affected in schizophrenia include facial affect recognition (Addington et al., 2006), mental state attributional style (Brune, 2005b; Brunet et al., 2003), empathy (Shamay-Tsoory et al., 2007), emotion processing, social perception and theory of mind (Horan et al., 2008).

Mothers with schizophrenia interact poorly with their infants (Riordan et al., 1999; Snellen, 1999; Wan et al., 2007). This is associated with impoverished thought and infant-directed speech {Wan et al., 2008; Wan, Penketh et al., 2008). In an inpatient assessment of 26 mother-infant pairs, Riordan, Appleby and Faragher (1999) observed greater interactive deficits in women with schizophrenia, relative to those with affective disorders. Mothers with schizophrenia were less responsive, less sensitive and less energetic, and more remote, silent, demanding, self-absorbed and intrusive during play with their infants. In a later extension of findings, the infants of mothers with schizophrenia were seen to exhibit higher rates of avoidant behaviour in response to the poorer interpersonal skills of their mothers (Wan, Salmon, et al., 2007).

Impaired social cognitions such as empathy, theory of mind (Brune et al., 2005b #; Sergi et al., 2007; Shamay-Tsoory et al., 2007), attributional style (Brune, Abdel-Hamid, Lehmkamper, & Sonntag, 2007), emotion processing and social perception (Horan et al., 2008) may translate into inadequate care by the mother. Sensitive responding will not always come easily where empathy, mentalising and social perception are impaired. Theory of mind is a cognitive component of reflective capacity. It is needed to anticipate and understand needs, and is fundamental in the psychological understanding of an infant. Understanding of the infant regarding inner mental processes might also be affected by impaired facial affect recognition. Empathy is an emotional component of reflective capacity. Where empathy is compromised, so too is the mother's awareness of the subjective experience of others, and possibly her infant during caregiving. Empathic abilities are vital in responding appropriately to others, and are often impaired alongside theory of mind in schizophrenia (Brune et al., 2005b; Sergi et al., 2007; Shamay-Tsoory et al., 2007). In terms of early caregiving, empathic responding seems impaired in schizophrenia (Riordan et al., 1999; Wan et al., 2007). An absence of empathy may result in the infant being handled somewhat roughly and dispassionately, warranting consideration in assessment.

The tendency to blame others rather than the self or the environment (known as self-serving bias) is common in schizophrenia. This attributional error contributes to a sense of persecution and interpersonal mistrust that is commonly associated with the illness (Horan et al., 2008; Brune et al., 2007). Relative to neurocognition and psychopathology, impaired mental state attributional style in schizophrenia is the single-best predictor of poor social competence (Brune et al., 2007). Regarding caregiving capacity, this deficit may translate to a tendency to adopt a blaming stance toward the infant, diminishing the mother's level of warmth towards the infant.

Emotion processing (identifying, facilitating, understanding and managing emotions) is another area social cognitive deficit in schizophrenia (Green et al., 2005; Horan et al., 2008). Earlier research shows that mothers with schizophrenia have a diminished capacity to interpret affective (especially facial) cues of their infants (Cohler, Grunebaum, Weiss, Gamer, & Gallant, 1977). Dyadic regulation of emotion, by definition, requires the mother to process the emotions of her infant through social perception and facial affect recognition. The extent of illness-related deficits to emotional processing may impact upon this regulatory function. Without the faculty of verbalisation, the new infant is left with behavioural gestures, known as ‘cues’, to communicate distress. Emotion processing, social perception and facial affect recognition will all influence emotional containment of the infant.

In summary, in addition to positive and negative symptoms, further insult to parenting capacity is likely to be occasioned by the illness-related deficits to cognition in schizophrenia. There is a high cognitive demand involved in understanding and buffering an infant’s level of arousal. This is compromised in mothers with schizophrenia. There is a clear need for the assessment of cognitive deficits in the clinical management of mothers with schizophrenia (Fitzgerald et al., 2004; Kurtz, 2005). There is research that demonstrates mild to moderate cognitive test improvement in chronic and first-episode schizophrenia following pharmacological treatment (Davidson et al., 2009; Keefe et al., 2007). Improved neurocognitive performance has been observed in patients as early as two months into antipsychotic treatment. The same has not been found regarding social cognitive deficits, with no change following antipsychotic treatment (Sergi et al., 2007). Findings of neurocognitive improvement should be viewed conservatively in light of research which demonstrates that medication-associated improvements in patients with schizophrenia are consistent in magnitude with practice effects seen in healthy controls (Goldberg et al., 2007).

The impact of limited service capacity

Studies of parenting outcome by diagnosis within inpatient settings show a diagnosis of schizophrenia to be a very strong predictor of social service intervention including child removal at the time of discharge (Howard et al., 2003; Howard et al., 2004; Salmon et al., 2003). While it is true that maternal schizophrenia poses risk to infant outcomes, these findings also suggest that there is a lower threshold for termination of parenting rights, and a higher rate of removal and mandatory supervision among these mothers, relative to other psychiatric cohorts. Salmon and colleagues found that while mothers with schizophrenia were perceived to be at greater risk of harming their infant, they were no more likely to cause harm when compared to other diagnostic groups in retrospect (Salmon, Abel, Cordingley, Friedman, & Appleby, 2003).

There are numerous limitations in current service capacity that repeatedly prejudice the outcomes of mothers with schizophrenia. While child removal is often clearly appropriate in this cohort due to safety concerns, there are many cases where the right type of clinical intervention can be more helpful. Mothers with schizophrenia struggle to meet the cognitive, emotional and financial demands posed by legal proceedings, and will in many cases feel unable to demonstrate their capacity (Lagan et al., 2009). There is a general expectation of negative transactions that pervades the relationship many mothers with schizophrenia have with services. This perpetuates the poor attendance for perinatal healthcare that occurs in this high-needs group. Where removal is not necessary or the best option for an infant, it is the responsibility of professionals to work towards building parenting capacity and away from the dichotomy of "remove versus don't remove" their infants.

Outcomes for children in out-of-home care are poorer than age-matched norms in several developmental areas including language acquisition (Stock, 2006), emotional and social adjustment (McConnell, 2006), mental health (Scott, 1998), academic attainment (Lindsey, 1994) and physical health (Buckley, 1999). It is increasingly apparent that placing children in alternative care does not avoid or mitigate the behavioural and emotional disturbances that protection authorities aim to prevent in their work with high risk families.

As well as a residual prejudice against mothers with schizophrenia, there is often a disastrous gap between perinatal and mental health services. Within psychiatric and obstetric units in Australia, there is an alarming shortage of facilities for the care of mother-infant pairs who are affected by maternal psychiatric illness. There is an urgent need for appropriately staffed specialist mother-baby facilities for these mothers. This should also be linked to trained staff that can support antenatal services identifying and supporting mothers with psychiatric illnesses during pregnancy. Without these services, intervention usually occurs at the point of crisis, when removal is the only viable short-term solution (Lagan et al., 2009).

Effective intervention requires a thorough understanding of the mother's parenting strengths and difficulties. We can only gain this understanding with an appropriate parenting measure that is suited to this very specific cohort. Currently, there is no measure of parenting capacity capable of meeting this clinical need. Without a valid and reliable assessment, it is difficult to make fair and appropriate decisions for these families. Currently, treatment approaches and decisions regarding custody are guided by assessments of parenting that are neither appropriate nor specific to mothers with schizophrenia. There is a need for a measure of early caregiving capacity that is valid and reliable for the schizophrenia population. Chapter 4 will be devoted to developing an instrument to address this unmet clinical need. Discussion will now turn to a closer examination of the impacts of maternal schizophrenia upon child outcomes.

Infant outcomes

Offspring of parents with schizophrenia suffer poorer outcomes than those of parents who do not have schizophrenia. These outcomes include a higher rate of psychiatric morbidity, symptomatology, mental health care and psychotropic medication use in adulthood, together with lower overall functioning in the social, economic, vocational and community settings (Parnas et al., 1993; Schubert & McNeil, 2003). While it is certain that outcomes can be explained in part by increased genetic loading for psychiatric illness, there is evidence to suggest that extrinsic factors act in concert with genetic aspects of schizophrenia in determining the child outcomes. It is likely that aspects of the gestational environment and the primary caregiving relationship influence the expression of various outcomes in children at risk for schizophrenia. During the 1980's, there was a burgeoning of interest in child outcomes associated with parental schizophrenia. As the bulk of this research was undertaken at this time, these early findings will be critically evaluated.

The Jerusalem Infant Development Study was a longitudinal program of research investigating child outcomes, particularly neurological development. Parental schizophrenia was found to be associated with a genetically determined neurointegrative deficit in offspring, presenting as disturbed motor and sensorimotor functioning in infants (Marcus, Auerbach, Wilkinson, & Burack, 1981). Within the schizophrenia study group, this neurointegrative deficit was shown to continue into childhood as cognitive and motor impairment (Fish et al., 1992). Relative to the healthy and clinical control groups, children of parents with schizophrenia showed higher rates of dysfunction in perceptual and motoric areas of neurobehaviour (Marcus, Hans, Auerbach, & Auerbach, 1993), together with impaired attentional capacities (Hans et al., 1999) at school age. This was followed by lower cognitive, vocational and social functioning by adolescence (Fish, 1987). Data collected at subsequent time points showed these childhood neurobehavioural signs to be markers for adulthood schizophrenia spectrum disorders (Hans, Auerbach, Auerbach, & Marcus, 2005; Hans et al., 1999). Poor social adjustment in adolescence was also found to predict later morbidity (Hans, Auerbach, Asarnow, Styr, & Marcus, 2000).

A significant limitation to this program of research was that *parenting quality was at no stage accounted for or ruled out as a contributor to poorer child outcomes (and thus a possible confounder to results)*. This compromises the validity of findings immensely due to the widely documented parenting deficits that have since been associated with schizophrenia.

It was shown within the Emory University Project that parental communication deviance and affective style contributed to child outcomes (cognitive and social competence at five years) above and beyond parental psychopathology (Goodman, 1987). It was also demonstrated that environmental factors including parental age, higher education, employment and social support had ameliorative effects upon child outcomes in this cohort (Goodman, 1987).

Within the Rochester Longitudinal study, offspring of mothers with psychiatric illness were studied from conception onwards. Within the offspring of mothers with schizophrenia, maternal diagnosis bore the least impact upon child outcomes, relative to severity and chronicity of the psychiatric illness and socioeconomic status of the family (Sameroff et al., 1987). This suggests that the nature of symptoms and their effects upon parenting behaviours bear more impact on child outcomes than the specific illness or genetic vulnerability in isolation.

The Stonybrook High Risk Project further supported the argument that impaired parenting contributes independently to poor child outcomes above and beyond genetic elements where parental schizophrenia is concerned. The rate of adult schizophrenia in the offspring of parents with schizophrenia, depression, bipolar disorder and no psychiatric illness was comparable across the four study groups (Weintraub, 1987). However, there was a higher rate of Borderline Personality Disorder (BPD) specific to the offspring of the schizophrenia group. BPD is known to relate to trauma in infancy and childhood (Crowell et al., 2009; Harned et al., 2010) and particularly, to emotional aspects of the nurturing environment relating to the quality of attachment (Bakermans-Kranenburg & van, 2009). The lack of an elevation in the incidence of schizophrenia, combined with the increase in BPD (a result of mainly environmental factors), renders it likely that the quality of parenting associated with schizophrenia is what contributes to poorer child outcomes.

Results from the Swedish High-Risk Project supports this. Higher rates of mental disturbance were found in the 6 year old children of parents with schizophrenia, relative to healthy controls (McNeil & Kaij, 1987). This was accounted for by an insecure attachment relationship at one year of age which, alongside psychiatric and obstetric variables, seemed to explain the observed disturbance in schizophrenia group children. The Finnish Adoptive Family Stud compared children genetically at risk for schizophrenia with adoptees of healthy control parents (Tienari et al., 1987). Here it was found that a disturbed adoptive family was an important condition for schizophrenia to be expressed by the high-risk group children in adulthood. While it is likely that adoption signals more serious parental illness (and therefore a higher propensity for heritable psychiatric illness in offspring), this study demonstrated that genetic loading in itself was not enough, with, poor caregiving environment also required to precipitate a poor outcome.

A study based upon Well-Baby Clinic information in Sweden found that compared to clinical controls, infants and young children (0-4yrs) of mothers with schizophrenia exhibited delayed walking, visual dysfunction, language skill disorders, enuresis, behavioural disturbance and poor social competence. Like the Jerusalem Study data however, parenting quality was not accounted for, seriously limiting the interpretability of findings. Childhood enuresis, behavioural disturbance and social dysfunction relate to parenting quality and style (De Bruyne et al., 2009). Without influence of parenting controlled for, it cannot be concluded a genetic loading for schizophrenia is the cause of poor outcomes in offspring (Henriksson & McNeil, 2004).

Also unaccounted for in many outcome studies are factors relating to antenatal development. Offspring of mothers with schizophrenia inherit increased liability for neurological disorder, seen to manifest as ‘soft’ and ‘hard’ neurological signs in early childhood. It is as yet unclear to what extent these outcomes are attributable to antipsychotic use in light of the neurological abnormalities associated with parental schizophrenia. Antenatal and obstetric complications have been shown to interact with genetic loading in producing poorer outcomes in infants of parents with schizophrenia. In the Copenhagen high-risk project, obstetric complications were positively related to a diagnosis of schizophrenia in the offspring of mothers with schizophrenia at 20 year follow-up. Within the same sample, it was found that at 25 year follow-up, low birth weight was related to a higher ventricle-to-brain ratio, an indicator of cerebral atrophy (Mednick, Parnas, & Schulsinger, 1987). As perinatal insults were not found to influence the outcomes of healthy controls, it can be inferred that there is a higher sensitivity of the brain to perinatal insult among infants of mothers with schizophrenia.

Within the Jerusalem Infant Development Study, it was found that while perceptual changes in offspring were linked to parental diagnosis, motoric signs were related to obstetric complications (Marcus et al., 1993), particularly low birth weight (Fish et al., 1992). Current research shows that low birth weight interacts with genetic loading for schizophrenia to increase the risk of poor academic and physical performance in school (Forsyth et al., 2013).

Much work has been done by Abel and colleagues to elucidate the variables which interact with maternal schizophrenia in its relationship to poorer child outcomes (Wan, Abel, & Green, 2008; Wan & Green, 2009; Wan, Penketh, et al., 2008; Wan, Salmon, et al., 2007; Wan, Warren, Salmon, & Abel, 2008). They propose that some of the poor outcomes are transmitted intergenerationally through compromised parenting (Wan, Abel, et al., 2008; Wan & Green, 2009). Within a sub-study of the Jerusalem Infant Development Study (Fish, 1987), it was found that the poor cognitive, vocational and social outcomes of children at high-risk for schizophrenia were ameliorated in families where there had been parenting intervention and where the parent's psychiatric treatment was of a good standard (Fish, 1987). This highlights that the nurturing environment can protect against poor child outcomes, regardless of genetic disadvantage.

In a review of interventions for dyads affected by maternal psychiatric illness, Wan and colleagues (2008) found that dyadic approaches focusing on maternal sensitivity and the attachment relationship were more effective in enhancing parenting and child outcomes than individual therapies aimed at symptom reduction (Wan, Moulton, & Abel, 2008). In Australia, much funding has recently been dedicated towards improving pregnancy screening care. Given the evidence that improved early caregiving may also mitigate against risk (Wan, Warburton, Appleby, & Abel, 2007), it seems worthwhile to invest research and clinical efforts towards evaluating and enhancing early parenting in schizophrenia. Overall, findings indicate that the outcomes of these children could be improved through better pregnancy care and early parenting intervention. It appears likely that genetic effects associated with maternal schizophrenia can be moderated by the quality of antenatal care and importantly, the quality of infant caregiving.

Conclusion

There is much to be considered in the assessment and treatment of dyads affected by maternal schizophrenia. The clinician is often faced with complex presenting problems that are compounded by difficult social factors. The infant may suffer poorer health, impaired cognition, or developmental delay as a result of poor pregnancy care, adverse obstetric outcomes, and genetic vulnerability. With an infant who is more difficult to parent, this will test an already challenged mother with schizophrenia who will experience increased difficulty in her parenting role. Fluctuating symptoms together with illness-related cognitive deficits will render external support during this time a necessity. The role of the clinician is to assess the individual areas of strength and need in such parents and target intervention accordingly.

Chapter 4: Measuring Infant Caregiving Capacity in Mothers with Schizophrenia

Introduction

The issues faced by mothers with schizophrenia are often complex, and clinical management is hampered by the lack of an adequate assessment tool to guide treatment. Although a number of early caregiving assessments do exist, none are specific to mothers with schizophrenia. Currently therefore, decision-making and intervention planning for mothers with schizophrenia are informed by a combination of unsuitable assessments and clinical impressions that are often biased. An aim of this study is to develop an assessment tool for mothers with schizophrenia that is valid, reliable and informative, such that better management can occur. Chapter 4 will outline considerations involved in assessing mothers with schizophrenia. A review of the available instruments will follow, and the chapter will end with a description of the newly developed Infant Caregiving Assessment Scales (INCAS).

Considerations when assessing mothers with schizophrenia

Mothers with schizophrenia present with unique needs when having their parenting capacity assessed. For decision making and intervention planning, it is imperative that assessment information is relevant and complete. Best practice involves measuring directly relevant caregiving behaviours with the use of observational methodology (Azar, Lauretti & Loding, 1998; Benjet, Azar & Kuersten-Hogan, 2003). When assessing mothers with schizophrenia, a working knowledge of the fluctuating (and recoverable) nature of symptoms should be held in mind, together with a strong working knowledge of the caregiving construct and the developmental nature of the role. When combined with an appropriate assessment instrument, this knowledge will enable data to be interpreted correctly and without bias. In the psychiatric setting, the aim of early caregiving assessment is to identify areas of strength and limitation at the outset of the role, such that complex presenting problems can be understood in terms of their remediable parts. A valid assessment of parenting capacity for this cohort will allow these mothers to demonstrate their ability during a period when they are vulnerable to having their infants removed. It is hoped that this instrument will inform the development of interventions that are targeted, tailored, and effective.

With assessments in their current form, there is no way to measure the true competence of a postpartum mother with schizophrenia. Assessments that are not specific to this population tend to confound parenting capacity with psychiatric illness due to inadequate rating criteria. There is a propensity to conflate symptoms with functioning where parenting capacity assessment is concerned. However while aspects of schizophrenia may affect the ability to be tested, these may not necessarily impede the ability to care for an infant. It is important that assessments remain sensitive to the caregiving construct when psychiatric symptoms are active. In a comparison of child outcomes between mothers with schizophrenia, depression, and no psychiatric illness, Goodman & Brumley (1990) found that *parenting practices and relational competence* were more potent contributors to between-group differences in child outcomes (intellectual and social) than maternal psychiatric diagnosis (Goodman & Brumley, 1990). Here parenting skill was established as an independent construct with a greater effect on child outcomes than psychopathology. We need to take into consideration the limitations of respondents with severe psychiatric illness (SPI), together with how these limitations may affect the accuracy of data derived by an assessment of function.

Ackerson advocated that there is a need for assessments to be ability-based rather than pathology-focused where dyads affected by maternal psychiatric illness (Ackerson, 2003). Although the level of a mother's functional disability will fluctuate with her symptom severity across time it is very important to remember that:

"..many people recovering from psychiatric disorders experience widespread improvement across life domains, including those of self-care, social, cognitive, vocational and parenting." (Risley-Curtiss, Stromwall, Hunt, & Teska, 2004, p.110).

It is appropriate to evaluate the extent of de-skilling from the perspective of *recovering competence*, with assessment as a starting point in the patient's recovery. To this end, it is important that assessments are able to detect a foundation of intact ability where it exists, at the outset of treatment-planning. To do this, a strengths-based approach to assessment is necessary. A strengths-based approach can be found in assessments that use positively-directed, ability-based scales, designed to detect improvement. Other important considerations when assessing in this cohort include test modality and assessment content. We will begin by considering modality.

Modality

The modality of an assessment is especially important for mothers with schizophrenia. Benjet and colleagues (2003) propose that assessment of parents with psychiatric illness should take a functional-contextual approach that is observational in nature (Benjet, Azar, & Kuersten-Hogan, 2003). Assessments in questionnaire and interview form are less reliable for measuring function, particularly where there are illness-related features interrupting the ability to recall, communicate and self-reflect, as in schizophrenia. During the postpartum period, many mothers with schizophrenia experience impaired insight and conceptual disorganisation which greatly compromise the accuracy of self-reported information.

Additionally, most patients with a severe and chronic mental illness (such as schizophrenia) will present with an extensive history of prior exposure to services including mental health, family support and child protection organisations. These services will all have imparted information regarding optimal parenting to the mother, and she may be familiar with the messages by the time she reaches you. Although often able to repeat these messages however, not all mothers will have carried them through. It will not be clear whether past advice has been incorporated into parenting behaviour until the behaviour has been directly observed. This can only be detected through observational, task-oriented assessment.

Content

The whole of the caregiving role should be reflected in the content of an assessment of caregiving capacity. Scales should be sufficiently detailed with respect to all aspects of the construct, as set out in the Framework (Figure 9) (Department of Health, 2000). According to the Framework, essential aspects of parenting capacity include basic care, safety, emotional warmth, stimulation, guidance, boundaries, and stability (Department of Health, 2000). As parenting involves practical as well as emotional care, the construct needs to be measured with reference to a sample of *caregiving behaviour*. The mother's ability to deliver care to her infant in a practical way is seldom measured by existing assessments. Existing assessments are not sensitive to the cognitive skills needed for basic care that are affected in association with schizophrenia. With a sample of the caregiving role as a whole, the skills assessed can extend beyond those involving psychological factors such as warmth and responsiveness, to include essential instrumental aspects such as hygiene, warmth, safety and shelter (Azar et al., 1998; Scott, 1998). Task-specific assessment will allow the basic instrumental aspects of caregiving to be evaluated in a structured and reliable way. Practical care warrants the same level of detail as is afforded to interactive and emotional components of the role. Indexing the caregiving role with a representative set of parenting behaviours (beyond simple play and interaction) will facilitate a well-rounded assessment with respect to all aspects of care.

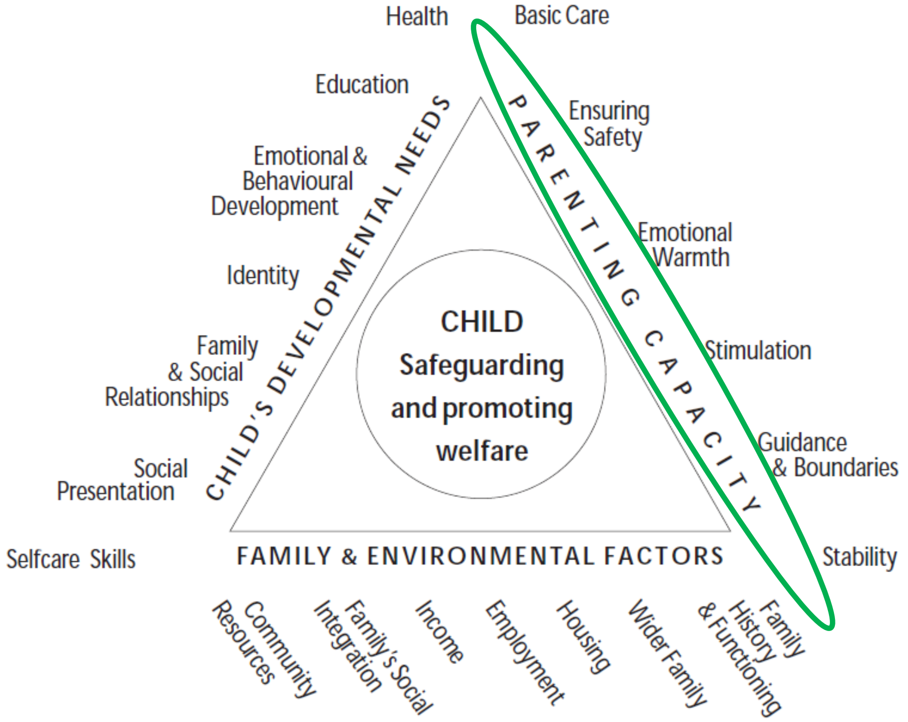

Figure 9. The Framework for the assessment of children in need and their families (adapted from Health, 2000)

Scott (1998, p80) emphasised that in assessing the capacity of vulnerable mothers;

"it is the quality of the immediate moment-to-moment behaviour of the parent towards the child that has the major life influence on the child's wellbeing…" (Scott, 1998).

The bulk of mother-infant interactions will likely occur during the everyday caregiving tasks of bathing, dressing, changing and feeding (rather than isolated periods of play). It follows that we should assess the mother within the context of delivering these activities. Current assessments tend to use play samples only, and this yields questionable data regarding capacity. An observed sample of ecologically valid caregiving activities should be used to index the construct behaviourally. Through task-specific rating criteria and relevant behavioural samples, both practical and psychological aspects of the role can be evaluated in detail.

There are specific assessment needs presented by mothers with schizophrenia. As removal happens early on for these mothers, assessments must be applicable to the first year of parenting when the infant is under 12 months of age. Instruments for the measurement of parenting capacity for schizophrenia require tight and specific anchor points (criterion) to reduce rater-effect and clinical bias, positively-directed scales to highlight level of existing ability and change over time, task-oriented observational methodology, and sensitivity to the cognitive aspects of basic care provision. Early caregiving capacity assessment needs to focus not only on emotional responsivity (captured by almost all measures in practice), but also material adequacy of the nurturing environment in facilitation of play, stimulation and learning. When considering the information produced by assessments, it is important that parenting is understood to be a maturational process. An approach that views parenting as a fixed capacity can be disabling for struggling mothers. Approaching assessment with the intention to identifying areas of strength together with areas in need of strengthening will better engage and assist mothers and their role-functioning.

Available Measures of Infant Caregiving Capacity

In research and practice, there are few assessments of caregiving capacity specific to mothers with psychiatric illness. The Bethlem Mother-Infant Interaction Scale (BMIS)(Kumar & Hipwell, 1996), the Global Rating Scales (GRS)(Murray, Fiori-Cowley, Hooper & Cooper, 1996), the Interaction Rating Scale (IRS)(Field, 1980), the Infant–Toddler Version of the Home Observation for Measurement of the Environment (IT-HOME)(Caldwell, 1984), the Maternal Regulatory Scoring System (MRSS)(Tronick, 1990), the Mind-Mindedness Procedure (MM){(Mei et al., 2001; Meins et al., 2003), the Parent Child Early Relational

Assessment (PCERA)(Clark, 1985), and the Parent-Child Observation Guide (PCOG)(Bernstein et al., 1987; Bernstein et al., 2005) are available. Of these however, most are designed for mothers with depression and anxiety, but have not been validated in more severe psychiatric illnesses such as schizophrenia (see Table 3).

In psychiatric cohorts, intervention is required promptly, thus a measure with utility for early infants is required. There are very few observational assessments for mothers of infants under one year of age. This greatly limits their usefulness in SPI populations, who require early assessment such that the infant's exposure to suboptimal caregiving can be curtailed. Some excellent assessments for infants over 12 months of age include the Strange Situation Procedure (SSP)(Ainsworth et al., 1978;Ainsworth, 1985), the Crowell Problem-Solving Procedure (Crowell & Feldman, 1988; Crowell, Feldman & Ginsberg, 1988), the Atypical Maternal Behaviour Instrument for Assessment and Classification (AMBIANCE)(Lyons-Ruth, Bronfman & Parsons, 1999), the Emotional Availability Scales (EAS)(Biringen, 1998), the Behavioural Observation Scoring System (BOSS)(Burgess & Conger, 1978), the Dyadic Parent-Child Interaction Coding System (DPICS-III)(Eyeberg, 2005), the Family Process Code (FPC)(Dishion, 1983), the INTERACT Coding System (Dumas, 1987), and the Kahen Systems (the Kahen Engagement Coding System (KECS) and the Kahen Affect Coding System (KACS))(Kahen, Katz, & Gottman, 1994). While these instruments have the potential to identify areas of strength and need, they are not able to do so early enough in the relationship and are therefore not as useful in the SPI population.

As previously mentioned, infant caregiving comprises psychological, relational, and instrumental components. Within the current review, it was found that the instrumental component is neglected in most assessments. In contrast, dyadic and emotional aspects of caregiving are measured in a most thorough and detailed way. The psychological component of caregiving is indexed by measures of reflective capacity (Aber, 1985; Fonagy et al, 1995;

George, 1984, 1988, 1996; Slade et al., 2004; Slade et al., 2005), insightfulness regarding the child's internal experiences (Oppenheim & Koren-Karie, 2013), the inner working model of the child (Benoit, 1997) and self-report measures of subjective parenting experience regarding stress, satisfaction and competence {e.g., Abidin, 1990; Guidubaldi, 1985; Gibaud-Wallston, 1978; Chilman, 1979).

Reflective Capacity and the Inner Working Model (IWM)

Reflective functioning is a part of psychological parenting which is important in sound parenting and sound parenting outcomes and in particular, the developing attachment relationship. Reflective capacity involves understanding the self and the infant in terms of mental states (desires, feelings, wishes, beliefs, and intentions) (Slade et al., 2005 ; Slade, 2005; Fonagy et al., 1997). Two widely used measures of reflective capacity include the Adult Attachment Interview (AAI) (Fonagy et al., 1995; George, 1984, 1988, 1996) and the Parent Development Interview (PDI) (Aber, 1985 ; Slade et al., 2004; Slade et al., 2005). Related to reflective capacity is the mother's own inner working model of attachment, which influences both her reflective capacity and the mother-infant attachment. The Internal Working Model of the Child Interview (IWMCI) (Benoit, 1997) is a measure of the mother's attachment-based pattern of relating to her child.

Assessments of the mother's subjective experience

Measures of the mother's subjective parenting experience are generally in self-report form. The gold-standard measure of parenting stress is the Parenting Stress Index (PSI)(Abidin, 1995). Satisfaction in the role is measured by the Parenting Satisfaction Scale (PSS) (Chilman, 1979). Feelings of competence are indexed by the Parental Locus of Control Scale (PLoCS)(Campis, 1986) and the Parenting Sense of Competence Scale (PSoC)(Gibaud-

Wallston, 1978). Vulnerability and risk are often explored using the Child Abuse Potential Inventory (CAPI)(Milner, 1986) and some subscales of the PSI (Abidin, 1990). Other psychological parenting measures include those which examine the mother's childrearing beliefs and attitudes, such as the Parent Opinion Questionnaire (POC) (Azar et al., 1984; Azar et al., 1986), the Parental Expectations Survey (Reece, 1992), the Parental Attitudes Toward Child-Rearing Scale (Easterbrooks, 1984), the Parental Acceptance-Rejection Questionnaire (Rohner, 1986), and the Insightfulness Assessment (IA)(Oppenheim & Koren-Karie, 2013). Commonly used measures of discipline and confidence include the Parental Disciplinary Orientations Scale (Abelman, 1986), the Parental Style Questionnaire (Bornstein et al., 1996), the Management of Children's Behavior Scale (MCBS)(Perepletchikova & Kazdin, 2004), and the Karitane Parenting Confidence Scale (KPCS)(Crncec, Barnett, & Matthey, 2008). Parenting cognitions and attributional style are measured by scales such as the Facilitators & Regulators Questionnaire (Raphael-Leff, 1985), the Mental Representation of Caregiving Scale (Reizer, 2007), the Parent Attribution Checklist (PAC)(Melson, 1993), and the Interpersonal Behaviour Construct Scale (IBCS)(Kogan, 1975). The quality of the parent-child relationship is indexed in part by the Sensitivity to Children Questionnaire (SCQ)(Stollak, 1973), the Parental Bonding Instrument (PBI)(Parker, 1979), and the Maternal Postnatal Attachment Scale (Condon, 1998). While highly informative regarding the mother's inner experience, a major drawback to these scales is that they are all self-report (usually questionnaires and interviews), and only cover small portions of the construct. Self-report methodology is not appropriate or reliable within a parenting cohort where illness involves cognitive deficit, formal thought disorder and compromised insight. As with all at-risk parenting cohorts where child removal is a reality, responding may be a product of vigilant impression-management rather than inner experiences around role functioning.

In a review regarding parenting capacity assessment in the child protection setting, Budd (2001) highlights that irrelevant constructs are often used to index parenting capacity (Budd, 2001). Tests of cognitive ability (e.g. the Wechsler Adult Intelligence Scale; WAIS) (Wechsler, 1997), academic achievement (e.g. the Wide Ranging Achievement Test; WRAT) (Wilkinson, 1993), and personality structure (e.g. the Minnesota Multiphasic Personality Inventory – 2; MMPI-2)(Butcher, 1989) are all commonly used. While it is not contested that these constructs influence the capacity to raise a child, they have not all been proven to relate *causally* to parenting function. Risely-Curtis and colleagues (2004) advocate for a move away from indirect proxies of parenting in favour of direct measurement of caregiving capacity (Risley-Curtiss et al., 2004).

Assessments of the relationship

The dyadic component of caregiving is measured with assessments of emotional interaction including Ainsworth's Global Rating Scales (AGRSMS)(Ainsworth, Bell & Steyton, 1971; Ainsworth, Bell & Stayton, 1974), the Maternal Behaviour Q-Sort (MBQS)(Pederson, 1995), and Murray's Global Rating Scales (GRS)(Murray et al., 1996). Unlike measures of subjective experience, assessments of emotional and relational caregiving are usually behaviourally-based. Relational assessments in their current form measure maternal contingency (Barnard, 1978), sensitivity (Ainsworth et al., 1971; Ainsworth et al., 1974; Murray et al., 1996), responsivity (Tronick, 1990) and mental state understanding (Meins etal., 2001; Meins et al., 2003). These capacities have been linked to emerging attachment, which in essence derives from maternal consistency, sensitivity, emotional availability, and reflective capacity interacting with the infant's contributions (Ainsworth et al., 1978; Ainsworth, 1985). While interaction-based scales provide rich and detailed assessment information however, they don't tell us enough about the way care is delivered to the infant in a practical sense. There are a number of instruments which attempt to incorporate instrumental aspects of caregiving into observational assessment.

Assessments of practical caregiving skills

As highlighted, practical (i.e. instrumental) aspects of caregiving capacity are especially crucial during infancy. Hygiene, safety, nourishment, clothing and shelter are essential for the care of an infant, but are not generally measured during assessment. The bulk of assessments measuring practical caregiving exist in self-report form. Some examples include the Infant Care Survey (ICS)(Froman, 1989), the Perceived Competency Scale (PCS)(Rutledge, 1987) and the Inventory of Functional Status After Childbirth (IFSAC)(Fawcett, 1988). These scales measure the mother's knowledge and skills regarding the health, diet and safety of her infant, together with role-related confidence and broad daily functioning. As discussed, however, self-report methodology is not appropriate for mothers with schizophrenia. Observational assessments of practical caregiving do not adequately detail the construct. Exiting assessments will be considered herein with respect to the adequacy with which they index the construct, represent it behaviourally, and are useful in severe psychiatric illness.

The majority of observational caregiving assessments are rated from filmed samples of communication and play. While this behaviour represents emotional competence, it fails to demonstrate practical skills. Routine caregiving tasks should form part of the behavioural sample if the assessment is to be reliable and valid. The bulk of interactions will likely occur during the everyday activities of bathing, dressing, feeding and changing, rather than during discrete periods of play. It follows that the mother should be assessed within the context of performing these tasks. Current assessments tend to use play samples only, yielding questionable parenting data.

Assessment Vignette: Jillian

Jillian was a mother with schizophrenia who was under the notice of child protection following accidental injury of the infant. At the time, the infant was 3 months of age. She presented to the hospital emergency department with a fractured skull which was the result of an accidental fall. Our service was to assess Jillian's caregiving capacity and provide appropriate recommendations. A bath was filmed, during which the mother appeared clumsy and precarious washing her baby while simultaneously gathering supplies along the way. This provided some good information to guide intervention, which would include advice around how to plan for a bath by setting out supplies prior to undressing the baby. Supported practice would surround correct and safe handling, lining the bath to prevent slippage, and never leaving the baby unattended. Jillian was then observed breastfeeding her baby. Here, a struggle between mother and baby was observed. The baby expressed an escalating series of 'enough' cues to Jillian, who consistently failed to notice. Instead of responding by pausing the feed, Jillian perseverated with forcing the infant's head into position at the breast such that feeding would resume. Here, a lack of emotion regulation, focus (on infant cues) and empathy were observed which could be addressed with video feedback work.

This vignette demonstrates the importance of an adequately representative behavioural sample in the assessment of dyads in need. Different caregiving tasks elicit slightly different capacities, so a spread of routine caregiving activities should be captured. Chatoor's Feeding Scale (FS)(Chatoor et al., 1997), the PCERA CClark, 1985), the NCAST (Barnard, 1978), and Mother-Infant Communication Screening (MICS) (Raack, 1989) all use behavioural samples containing one or more caregiving behaviours. A limitation common to each of these, however, is the *absence of instrumental rating scales*. The behavioural sample, although containing practical skills, are only rated for their emotional quality. The PCOG is another assessment that is rated from filmed caregiving activities. As with the abovementioned scales, however, the PCOG fails to cover this aspect of the construct adequately with its scales. Within the PCOG, only one of the five parenting sub-scales (*responding to child's needs and wants*) quantifies instrumental skill. The IT-HOME measures material adequacy of the caregiving environment, stimulation and dyadic interaction. Unfortunately however, this tool does not contain subscales relating to practical caregiving skills.

The BMIS is one of only a few mother-infant assessments to incorporate practical skills within the behavioural sample and the rating criteria. It is the only assessment covering practical skills that has been validated on SPI cohorts (Kumar & Hipwell, 1996). Unfortunately, the scales contain loose rating criteria which fail to cover the construct in detail. The BMIS measures practical caregiving with two rating scales, *General Routine* and *Physical Contact*. While setting out to measure practical caregiving however, these scales do not capture the construct. The *General Routine* scale does not describe skills beyond task-related organisation and autonomy:

General Routine

0	Well organised in relation to looking after baby-e.g. feeds, nappies are generally prepared in good time. Unflustered by unexpected minor problems. Copes independently.
1	As above (0) but occasional lapses which result in staff reminding or prompting mother. No serious difficulties.
2	As above (1) but lapses are more frequent and severe, so that staff often have to intervene and help.
3	Very disorganised. Requires considerable intervention and help from staff every day.
4	N. A. Separated most of the time.

Physical Contact contains non-specific criteria for the coverage of infant holding and handling:

Physical Contact	
0	Mother generally holds and supports baby in a relaxed and efficient manner. Seeks and maintains physical contact with sensitive awareness of baby's state (eg. alert, playful, drowsy, asleep).
1	As above (0) but occasionally seems 'out of tune' with baby eg. picks up too often or too little. Contact may appear mechanical or brusque.
2	As above (1) but mother is more persistently and obviously insensitive to baby's state. Can nevertheless hold baby 'successfully' for a few minutes at a time.
3	As above (2) but unable to hold baby for more than a few moments without disturbing him/her.
4	N. A. Separated most of the time.

Holding and support are central in early caregiving. The rating criteria for *physical contact* do not specifically measure this skill. Above all, holding relates to physical safety, achieved through coordinated handling and physical control. Within *physical contact*, the word 'successfully' is used, which does not specify these aspects of the skill. Handling also requires correct holding of the infant's body with regard to technicalities such as neck, head and spine support. Words such as 'efficient' and 'successfully' do not cover this. The words 'in/out of tune' and 'brusque' hint at but do not provide a direct means for rating the extent to which the infant's need for physical comfort is met by the mother's physical handling. While these words direct focus to the mother's input on this dimension, they do not require the infant's experience to be considered. Furthermore, the criteria for *physical contact* equate quantity of holding with skill. This is counter to what was found by Ainsworth in her study, where the *contingency* of physical contact was more important than quantity in contributing to emotional outcomes (Ainsworth et al., 1978).

It was found during validation that the dimensions of this instrument were unable to measure practical caregiving skills with sufficient detail to detect variability. There are other drawbacks too, in that it takes a week to rate a mother with the BMIS, and its utility is confined to the inpatient setting. Despite its limitations, the BMIS (Kumar & Hipwell, 1996) is a task-oriented observation tool that attempts to measure the caregiving role as a whole and takes an important step towards systematising assessment.

The assessment environment is another methodological feature that can influence validity significantly. It is specified within most observational protocols that the situation during testing be quiet and minimally distracting, such that the mother's attention is undivided. These controlled situations do not resemble the home environment and are thus not ecologically valid. Spontaneity and chaos produce the emotionally charged moments which typify the mother-infant dynamic. These moments of disharmony stimulate the mother's full potential to be empathic, physically gentle, and safe with her infant when her emotional arousal is heightened. Artificially calm interactive environments are of limited ecological validity.

The MBQS (Pederson, 1995) incorporates an induced split-attention caregiving task, which better approximates natural caregiving. As with most measures however, this tool only quantifies emotional capacities without examining practical skills. The AGRSMS (Ainsworth et al., 1971; Ainsworth et al., 1974) use the most valid index of caregiving function. Like the IT-HOME, AGRSMS ratings are based on in-home observations of the dyad throughout caregiving. The AGRSMS require a behavioural sample containing the entire range of caregiving behaviours. Like other scales however, a drawback of the AGRSMS is its failure to yield practical caregiving scores due to the emotionally-based content of rating scales.

Assessment Vignette: Melissa

Melissa was observed while she was acutely unwell with schizophrenia as she fed her infant during a home visit. The clinician arrived to find the infant sprawled on her back, facing a wall as she strained against rolling into the backrest of the lounge. The bottle was held in place between two cushions, jutting out towards the infant's face so that with some *effort, she was able to self-feed. This mother did not enjoy handling her infant and her nappies were rarely changed. Consequently, she was often wet, uncomfortable and smelling of urine. This mother had previously been filmed at the clinic with her infant during five minutes of face-to-face play. As the infant had been strapped into a high chair during the procedure, the lack of physical contact went undetected.*

The extremity of this situation was not evident during the laboratory-based play session, unlike during the home visit. This case of Melissa highlights the importance of ecological validity, influenced by the testing environment and the behavioural sample. Assessments in their current form do not measure instrumental abilities effectively for a variety of reasons. Many don't index parenting with caregiving tasks, and where caregiving tasks are included within the behavioural sample, the rating scales either focus solely on emotional aspects of the role, or contain broad brush-stroke criteria for rating instrumental skill.

Table 3 contains a summary of currently available infant caregiving capacity assessments. Measures meeting the following criteria were included:

- Utility for infants under 12 months of age
- Available psychometric data
- Currently in use
- Observational methodology
- Functional assessment
- Behavioural sample includes mother-baby activity

Table 3.Currently available infant caregiving capacity assessments.

Instrument	Skills		Behavioural sample		Duration	Environment	Cohort
	Prac.	Emot.	Caregiving	Interaction			
AGRSMS				■	12-16h	Home	Healthy
BMIS			■	■	1wk	Inpatient	SPI
CARE				■	3m	Flexible	High-risk & Maltreating
DMC		■		■	5m	Laboratory	Healthy
FS			■		20m	Laboratory	Feeding disorders
GRS				■	5m	Flexible	Depression
IRS				■	3m	Laboratory	Depression
IT-HOME					1h	Home	High-risk SPI
KIPS				■	20m	Home	Healthy
MBQS		■		■	90m	Home	Healthy
MICS		■			Not specified	Healthcare centre	High-risk
MIM		■		■	30-60m	Laboratory	High-risk
MM				■	20m	Laboratory	SPI & Normal
MRSS				■	6m	Laboratory	Dep/Anx Healthy
NCAST	■	■	■	■	Not specified	Flexible	Healthy
PCIS		■		■	20m	Flexible	Healthy
PCERA		■	■	■	20m	Laboratory	SPI
PCOG		■	■	■	15m	Laboratory	SPI

AGRSMS: Ainsworth's Global Rating Scales of Maternal Sensitivity (Ainsworth et al., 1971; Ainsworth et al., 1974); BMIS: Bethlem Mother-Infant Interaction Scale {(Kumar & Hipwell, 1996); CARE: CARE Index (Crittenden, 1979-2004); DMC: The Dyadic Mutuality Code (DMC) (Censullo, 1991; Censullo, Bowler, Lester, & Brazelton, 1987); FS: The Feeding Scale (Chatoor et al., 1997); GRS: Global Rating Scales (Murray et al., 1996); IRS: Interaction Rating Scale (IRS) (Field, 1980); IT-HOME: Home Observation for Measurement of the Environment: Infant –Toddler Version (IT-HOME) (Caldwell, 1984); KIPS: Keys to Interactive Parenting Scale (Comfort, 2006); MBQS: Maternal behavior Q-Sort (Pederson, 1995); MICS: Mother-Infant Communication Screening (Raack, 1989); MIM: Marschak Interaction Method Assessment (MIM) (Jernberg & Lindaman, 1987-2005); MM: Mind-Mindedness procedure (Meins et al., 2002); MRSS: Maternal Regulatory Scoring System (Tronick, 1990); NCAST: Nursing child assessment feeding scales / Nursing child assessment teaching scales (Barnard, 1978); PCIS: Parent/Caregiver Involvement Scale (Farran, 1986); PCERA: Parent Child Early Relational Assessment (Clark, 1985); PCOG: Parent-child observation guide (Infant Version) (Bernstein et al., 1987; Bernstein et al., 2005). SMI: Severe Psychiatric Illness.

A note on the inclusion of infant scales

A final observation regarding current assessments is that many contain scales measuring infant contributions {(e.g. Barnard, 1978; Bernstein et al., 2005; Caldwell & Bradley, 1984; Clark, 1985; Crittenden, 1979-2004; Field, 1980; Jernberg, 1987-2005; Kumar & Hipwell, 1996; Murray et al., 1996). In doing so, these scale authors acknowledge the transactional nature of caregiving and development, with both members of the dyad active participants (Sameroff, 1990). The AGRSMS (Ainsworth et al., 1971; Ainsworth et al., 1974) differed here, approaching assessment under the assumption that each scale score represents combined dyadic contributions (Ainsworth et al., 1974). Within the BMIS, *Baby's Contribution* showed the least variability of all sub-scales (Kumar & Hipwell, 1996). In a study examining the psychometric properties of the NCAST across ages (Hodges, Houck, & Kindermann, 2007), unstable interactive capacities among infant under 36 months were found to compromise the validity the scale where infant subscales were included. Of relevance to the current study regarding instrument development, it was found that while maternal scales were stable over time, infant scale scores were not. In view of these findings, it seems logical to assess *joint* communication for contingency and synchrony rather than each member's contribution alone.

In summary, assessments in their current form are not appropriate for use in the context of maternal schizophrenia. Assessments for this population are required to be suitable for infants under 12 months of age, employ task-oriented observational methodology, contain specific and detailed rating criteria, and measure the caregiving role as a whole with the inclusion of instrumental skills. The current body of assessments for mothers with SPI and infants under 12 months of age fall short of these specified requirements. Limitations derive from problems with ecological validity regarding the behavioural sample and testing environment, together with inadequate coverage of instrumental skills. We will now examine the newly developed Infant Caregiving Assessment Scales, which were designed with respect to identified needs in response to the current review.

An Introduction to the Infant Caregiving Assessment Scales (INCAS)

The Infant Caregiving Assessment Scales (INCAS) measure the early infant caregiving capacity of women who are affected by schizophrenia and other severe psychiatric illnesses. Development was based upon two central tenets; firstly, that mothers with psychiatric illness hold the right to bear children and where appropriate, raise their infants, and secondly, that all infants hold the right to receive 'good enough' early care. A routine aspect of psychiatric care during the perinatal period involves upholding the rights of the dyad. This entails understanding the nature of any role-related impairments and improving these through focused intervention. The INCAS was designed to support this aspect of service provision as a start-point in intervention-planning. The tool's focus on maternal behaviours linked to homeostasis, physical safety, and emotional security renders it relevant to earliest infancy.

The INCAS comprises a series of behavioural tasks that are filmed and rated retrospectively. These tasks form a behavioural sample which represents the mother's level of caregiving function. In the home (or residential) setting, the mother performs a repertoire of everyday tasks that are central in the care of an infant. These include bathing, dressing, feeding and changing a nappy. The sample is evaluated within a structured observation protocol that includes detailed flowchart inventories. Caregiving is rated along 16 global parenting sub-capacities (dimensions), using nine-point Likert-style scales. The INCAS adheres to a functional-contextual approach to assessment that incorporates task-specific, criterion-referenced methodology (Benjet et al., 2003).

The INCAS follows in the tradition of Ainsworth (1985; 1978) by measuring interactions as they occur during routine caregiving exchanges. Ecological validity of the scale is supported by filming within the naturalistic caregiving environment.

The flowchart inventories standardise observations, promoting a task-centred focus during rating. As depicted in Table 4, each flowchart provides a detailed checklist of task-related sub-steps that relates to the individual task being observed. There is the option to rate subtasks as 'present' or 'absent', and space underneath for any extra information needed to clarify ratings. The flowcharts were informed by selected infant-care manuals {INTERGROWTH-21st & Neonatal Group, 2009; Kids Health, 1995/2014; NIH, 2014; Pediatrics, 2009; Provena, 2014; National Centre for Infants, Toddlers & Families, 2014) and observation of mother-infant dyads. By encouraging the rater to focus on caregiving behaviour with the use of flowchart inventories, it is hoped that subjective impressions with biasing potential are excluded from the outcome of assessment. An example flowchart is provided.

Steps for Breastfeeding a New Infant:

Present	Absent	Step
☐	☐	Ensure hands are clean.
☐	☐	Place a towel or cloth nappy nearby for easy access during feeding.
☐	☐	Position yourself in a way that is safe and comfortable for feeding (ie; not 'hunching' over).
☐	☐	Position baby close to your body with head, shoulders and hips facing you. Ensure that the head is in close to your breast.
☐	☐	Brush baby's cheek to encourage mouth to open and head to turn in.
☐	☐	When the baby's mouth opens, pull closer in to the breast and commence feeding.
☐	☐	Allow baby to feed on first side until active sucking has stopped.
☐	☐	Support baby's body in either a sitting position on your lap, or against your body over your shoulder.
☐	☐	Gently rub and/or pat baby's back so that excess wind can be expelled.
☐	☐	When your baby is ready, position on your other side and recommence feeding.
☐	☐	Allow baby to feed until active sucking has stopped.
☐	☐	As before, support baby's body in either a sitting position on your lap, or against your body over your shoulder.
☐	☐	Gently rub and/or pat baby's back so that excess wind can be expelled.

Proficiency
Ensure that baby's entire body length is supported, with the spine and head in line.

Proficiency
For effective latching and milk flow, most of the areola should be in the baby's mouth.

Interaction
To ensure that sufficient calories are taken in, gently vocalise throughout feeding to keep your baby awake.

Empathy
Do not force baby to drink when baby repeatedly turns head or otherwise indicates that a break is required. Likewise, do not terminate active sucking unless there is a problem with latching. Detach baby as below, do not pull straight off the breast.

Proficiency
To correct attachment, insert your little finger into corner of baby's mouth, placing between the gums. Gently remove from the breast

Comments/additional information:

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Table 4. INCAS flowchart diagram for breastfeeding.

INCAS Dimensions

Caregiving performance is rated along 16 dimensions. Dimensions measure aspects of the mother's behaviour that contribute to her overall ability to deliver care in a way that supports physical, cognitive and emotional infant development during the earliest stages of life. Dimensions were identified through a review of the literature relating to normal infant development (Chapter 1) and parenting capacity (Chapter 2). Within Chapter 3 on parenting with schizophrenia, it was highlighted that some aspects of care provision are affected in schizophrenia in association with symptomatology, medication, and cognitive features of the illness. Rating criteria are therefore sensitive to the cognitive deficits frequently seen in this cohort. Instrumental and emotional caregiving dimensions are summarised in Table 5.

Table 5. INCAS Caregiving Dimensions.

Domain	Dimension	Description
Instrumental		
	Protection	Safety, harm minimisation, hygiene and health-promoting behaviours.
	Provision	Meeting basic material needs required to bathe, clothe, dress, feed, and shelter new infant.
	Diligence	Effort, conscientiousness, thoroughness, commitment to task completion.
	Competence	Skill, knowledge, ability.
	Focus	Task-oriented attenuation, vigilance.
	Planning	Task-related planning and preparation.
	Holding	Physical handling & control.
	Precision	Accuracy & sequencing.
	Adaptability	Responsivity & flexibility.
	Maternal Self-efficacy	Task-specific confidence, initiative & autonomy.
Emotional		
	Emotion regulation	Soothing, settling, buffering, tempering of arousal, affective attunement.
	Attributional style	Extent to which infant is held accountable for adverse events during task completion (as indicated verbally by mother).
	Affection	Warmth, mood, tone.
	Interaction	Adequacy and contingency of social stimulation & communication with infant.
	Empathy	Concern for subjective experience of the infant; extent to which caregiving is gentle, child-centred, considerate.
	Mindedness	Understanding of infant's experiential & intentional stance (evidenced in mother's correct verbalisation(s) of her infant's mental experience).

In response to the findings of the current review, INCAS rating scales have been developed with highly detailed rating criteria to assist in minimising rater-bias. Due to its high level of detail, the INCAS enables initially complex problems to be formulated simply for the subsequent tailoring of intervention. The scales are positively-directed to aid in the early treatment aim of identifying an intact foundation of ability within mothers.

Administration, observation and scoring

To administer assessment, participants are instructed as outlined in Box 1. Filmed tasks are then rated retrospectively. Footage is examined in close consultation with the flowcharts, and rating is scaffolded by the anchor points set out within each dimension.

Box 1. INCAS Administration Procedure.

Step 1. Build rapport with mother-infant dyad. Show interest in the patient and her infant, and communicate your intention to work collaboratively with the dyad towards achieving an enjoyable and successful parenting experience.

Step 2. In a naturalistic setting (ideally the home environment) film the mother as she completes the core tasks of caring for her infant. Tasks can be completed in any order, depending upon the needs of the dyad.

Example:

Introductory dialogue

Thanks for helping us today. We are interested to see how you bathe, dress, feed, and change your new baby. There is no right or wrong way to do this, and actually there are probably no two mothers who will do things the same. We have chosen some everyday tasks because we are interested in how you go about getting them done. While you are completing each task, try your best to imagine that there is no-one else here except for you and (baby's name). I will help by being as quiet as possible so that you and (baby's name) can work along together as you normally would at home. Take as long as you need to do each task, and if you feel like having a break just let me know and we can stop at any time. There is no hurry with anything today.

Does this all sound ok so far?

Do you have any questions before we begin?

Ok let's begin with bathing (baby's name) first, and then dressing him/her straight afterwards. Is this an ok place to start with you?

(Mother gives baby a bath and dresses him/her afterwards)

Now let's move on to feeding your baby.

(Mother feeds baby)

Ok that's great, thanks (mother's name). The final thing we'd like you to do today is change (baby's name)'s nappy.

(Mother changes baby's nappy)

NB. It is important to tell the mother that your silence throughout filming is for her benefit. This way she will not worry that something is wrong with her performance, and will be less likely to feel compelled to converse with you while being filmed. Additionally, many mothers will feel a need to complete tasks as quickly as possible unless you specify that this is not necessary. And finally, if the mother and her baby are more naturally ready to feed rather than bathe first, change before feeding, or require a lapse in time before commencing a feed, it is important that you encourage her to do so. This will enhance the ecological validity of your observation and assessment.

Box 2 contains a summary of the procedure for observing and rating the footage:

Box 2. INCAS Rating Procedure

Step 1. Back at your place of work, review the footage freely a first time before commencing the rating process.
Step 2. Review the footage a second time in consultation with the task-specific flowchart inventories. This will help to focus your attention onto the mother's task-related capacity. Rate the checklists as you go along, adding extra information where needed.
Step 3. Review the completed checklists, paying attention to (ordering of sub-tasks and) any difficulties that the mother (seemed to experience) encountered. Think about the dimensions and the areas of parenting from which task-related difficulty originates.
Step 4. In close consultation with rating criteria, score the mother's overall capacity on each of the global dimensions.

The INCAS in action: An example

By necessity, assessment with the INCAS is a dedicated process. Dimension scores yield rich and fine-grained information, a must for high-needs dyads. The fine-grained break-down provided by the INCAS can be used by health professionals to determine where the mother requires assistance and intervention in order to safeguard the wellbeing of her developing infant. Use of the INCAS to assist in this process will be demonstrated with the example of Emily and her son Michael.

Emily

Emily was a 32 year old primiparous mother with schizophrenia who was admitted to a psychiatric unit following childbirth. A florid psychotic episode had been precipitated by the upheaval of pregnancy and birth. Under the care of her treating team, Emily's positive symptoms (persecutory delusions, excitement and hostility) responded well to medication. After the positive symptoms had settled, Emily had residual negative symptoms (affective blunting and emotional withdrawal) which were slower to improve. By eight weeks *postpartum however, her state was recovering and the staff began preparing her for discharge. At this point there was uncertainty around sending the dyad home, as although Emily's symptoms had stabilised, she appeared to be struggling in her caregiving role. Her infant's affective state was consistently negative and hyper-aroused. He was predominantly fretful and often seemed inconsolable. A growing sense of helplessness was apparent in Emily, and there was concern that she was vulnerable to relapse.*

After first ruling out any infant medical conditions, the next area for consideration was Emily's caregiving. While it was assumed that her schizophrenia must be contributing to her caregiving difficulties, it was unclear which of her behaviours were problematic. On the surface, Emily's parenting seemed adequate. The infant was at all times clean and appropriately clothed. There were no signs of nappy rash, injury or illness, and he had been steadily gaining weight. Passing ward staff had observed Emily's physical handling to be gentle and safe. Regarding her emotional skills, staff reported that although Emily's demeanour was mostly solemn and quiet, her interactive style was not harsh or bizarre. By all accounts, the infant's persistent distress did not seem proportionate to his caregiving experience. A filmed sample of face-to-face interaction was taken to explore the relationship more closely. Examination of the footage revealed that the communications were impoverished, with sparse vocalisation and little mutual eye-contact. While highlighting the lack of engagement however, this did not serve to explain the infant's fearful responses and his consistently dysregulated state. His level of distress did not seem in proportion to Emily's communication shortcomings. The dyad was then filmed completing a bath. Within the context of the heightened vulnerability of this situation, the difficulties became easier to understand.

Emily began by undressing the infant on her bed. She then moved to the next room to fill his bath with water. While waiting, the infant was left uncovered on the bed, which had no *side-barriers to protect him from falling. Lying on his back, he craned his neck in search of his mother, flailing his arms as he did so. As the minutes passed, his skin became mottled with the cold and he became distressed. Five minutes later, Emily returned with the full bath. She lifted the infant from the bed and with a firm and confident hold, lowered him into the water. Upon making contacting with the water, the infant let out a high-pitched wail and again began flailing his arms. Visibly shaken, Emily quickly lifted him out. The water had been too hot for her infant's new skin, and as it later transpired, Emily had not tested the temperature beforehand. She replaced the infant on the bed and wheeled the bath out of the room again, where she spent a considerable time re-adjusting the temperature. She then returned and attempted to bathe the infant again, this time with more difficulty due to his state. During bathing, the infant wailed and shuddered with distress as Emily went about cleaning him. After the bath, she replaced him on the bed and dried his body with a towel, going to efforts to remove all moisture from his skin. She then turned to retrieve his clothing from a cupboard, accidentally leaving his face covered with the towel. The infant continued to cry as Emily applied creams and powder, and methodically fastened his nappy and clothed him. The filmed caregiving sample was rated retrospectively with the INCAS.*

Emily was rated along 16 dimensions of instrumental and emotional care. Her instrumental scores are displayed in

Figure 10. The rating criteria are provided to support the discussion of her results.

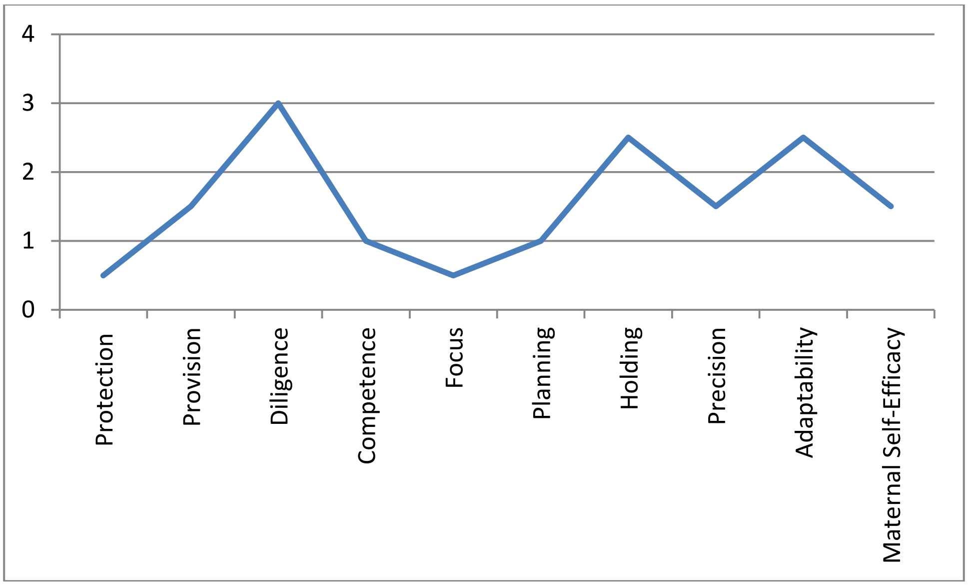


Figure 10. Emily's practical caregiving skills, as measured by the INCAS.

Emily's practical caregiving strengths include *diligence*, *holding* and *adaptability*.

Diligence

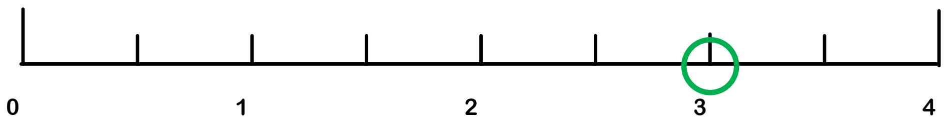
0 Mother shows a lack of commitment towards completing the caregiving tasks adequately, employing insufficient effort throughout. Tasks are as a result not completed at a sufficient standard.

1 Mother appears somewhat committed to completion of the tasks, however more effort is needed in order to complete tasks at a good-enough standard.

2 Tasks completed with satisfactory commitment and effort. Tasks are as a result completed at a good-enough standard or where not good-enough, completed inadequately due to insufficient skill.

3 There is evidence of commitment to successful task completion, with much effort employed throughout caregiving in order to 'get things right'. Tasks are as a result completed at a good standard or where not good-enough, completed inadequately due to insufficient skill.

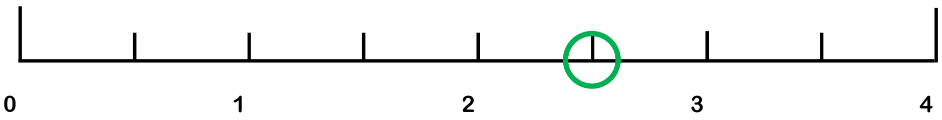
4 Tasks are completed conscientiously by the mother, with meticulous care and effort afforded throughout in order to 'get things right'. Tasks are as a result are completed at an excellent standard or where not good-enough, completed inadequately due to insufficient skill.



Emily received a score of 3 for *diligence* as there was evidence of intentional effort at all times throughout caregiving. Although there were some mistakes which caused serious limitations to safety and comfort, Emily laboured over each aspect of the task in the pursuit of a successful result. She spent extra time applying creams and powders, took great care to position the nappy correctly, and tried to rectify her mistakes where they occurred.

Holding

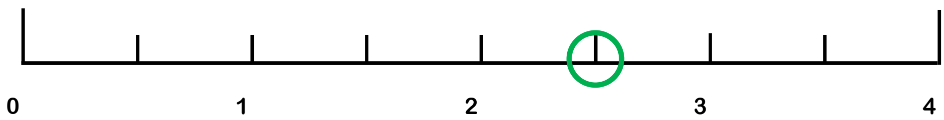
0 Mother's physical coordination and control is poor throughout task completion, resulting in incorrect, uncomfortable, or unsafe handling of the infant.
1 Mother demonstrates some physical coordination and control, however handling of the infant and/or control throughout task completion remains incorrect, uncomfortable, or unsafe for the infant.
2 Mother exhibits adequate physical coordination and control throughout task completion, and handling is correct, safe, and at most times comfortable for the infant.
3 Mother exhibits good physical coordination and control throughout task completion, and handling is correct, safe, and at most times comfortable for the infant.
4 Mother exhibits superior physical coordination and control throughout task completion, and handling is correct, safe, and at all times comfortable for the infant.



Emily received a score of 2.5 for *holding*. She demonstrated firm and secure handling of the infant throughout the bath, cleaning and balancing him simultaneously. She lifted him gently and safely in and out of the bath, supporting his head and neck. While her handling satisfied criteria for a score of over 2 on the *holding* scale, a score of 3 was not given as her movements were slowed (evident during drying and dressing), causing the infant to become cold and dysregulated.

Adaptability

0 Mother is largely rigid in her approach to task completion, displaying inadequate responsivity to unexpected events or changing needs of the infant.
1 Mother is somewhat rigid in her approach to task completion, displaying limited responsivity to unexpected events or changing needs of the infant.
2 Mother is able to respond adequately to most unexpected events or changing needs of the infant during task completion.
3 Mother shows flexibility in her approach to task completion, responding well to unexpected events and changing needs of the infant.
4 Mother is spontaneous, flexible and responsive in her approach to task completion, adjusting her actions to most unexpected events and changing needs that occur during task completion.



Emily received a score of 2.5 for *adaptability*. Where she realised that the bath water was too hot for the infant, she removed him immediately and added cold water. During dressing, Emily had to apply a nappy twice, as he wet the first nappy while cream was being applied. Emily responded by removing the wet nappy, cleaning the area thoroughly, and providing a fresh nappy before continuing. This is considered adequately flexible behaviour as the infant was left clean and dry. Emily was given an extra ½-point as she demonstrated flexibility more than once. She did not receive a higher score because in other respects, her behaviours were not contingent to the situation. For example, Emily carried on with her detailed routine of drying and applying creams while the infant was distressed, cold and frightened after the bath. A more adaptive response may have been to pause the routine and soothe him (for example, by lifting and holding him) prior to carrying on with dressing. As it was a cold day, it could also have been a more flexible approach to dress the infant more quickly so that his body was covered sooner, spending less time on the details of drying and applying cream.

Limitations to Emily's instrumental caregiving skills could be seen in her scores on *protection* and *focus*.

Protection

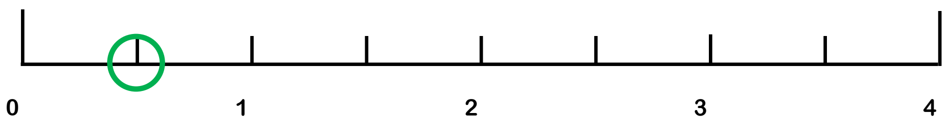
0 Mother fails to protect infant from harm and ill health. There are one or more instances whereby a clear risk of harm to the infant is apparent in conjunction with mother's behaviour.

1 Some protective behaviours are observed, however infant's safety and/or health are occasionally at risk in conjunction with mother's behaviour.

2 Mother adequately protects infant from harm and ill health. Mother's behaviour throughout caregiving does not compromise safety and/or health of the infant.

3 Mother displays a good ability to keep infant safe and healthy. Protective behaviours are often apparent throughout caregiving.

4 Mother demonstrates a superior ability to keep infant safe and healthy at all times. Protective behaviours are consistently apparent throughout caregiving.



Emily received a score of 0.5 for *protection*. Leaving the infant alone on the bed placed him at risk of a fall. Leaving his body uncovered on a cold winter's day left him prone to illness. Failing to test the temperature of the water before bathing was another dangerous oversight which compromised safety. While ultimately Emily's ability to protect her infant was inadequate, she was not given a score of 0. There were examples of protective behaviour during caregiving which lifted her score by half. She did manage to support the infant's body throughout bathing in a way that prevented him from slipping under the water or falling to the floor during transfers to and from the bed. Additionally, she attempted to guard against rash by drying the skin thoroughly and applying cream and powder. These are all examples of protective behaviours which demonstrate that Emily has some strength in this area.

Focus

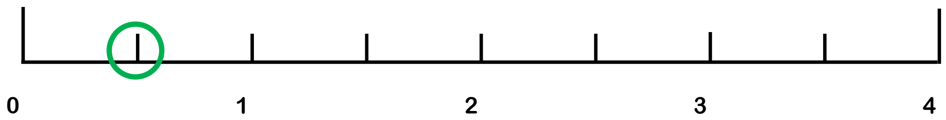
0 Mother exhibits distractibility and an inability to remain focused on either the infant or the task at hand. There is clear risk to the infant in association with this lack of focus.

1 Mother somewhat disorganised in attending to either the infant or the task at hand; easily distracted. There is a potential for risk to the infant in association with insufficient focus.

2 Sufficient attention and focus are present during task completion. There does not appear to be any risk to the infant as a result of insufficient focus.

3 Mother consistently attends to the infant and tasks at hand. The infant's safety is enhanced as a result.

4 Mother is perceptive and aware at all times, displaying vigilant attention to the infant and tasks. The infant's safety is enhanced as a result.



Emily received a score of 0.5 for *focus*. Despite her diligence with creams and powder during dressing, Emily failed to attend to the infant as a whole. She seemed preoccupied with small aspects of the task to the exclusion of the wider situation, leaving the infant in a protracted state of agitation. As a consequence of her narrowed focus upon drying his skin, Emily missed the infant's potent signals of distress. Additionally, her meticulous approach to drying and dressing came at the expense of her noticing when he spat up milk. Although the milk ran down into the creases of the infant's neck, it could just as easily have obstructed his airways, and as it was, his neck remained damp and prone to irritation.

Emily's emotional scores are displayed in Figure 11. Her emotional caregiving strengths could be seen in her scores for *attributional style* and *mindedness*.

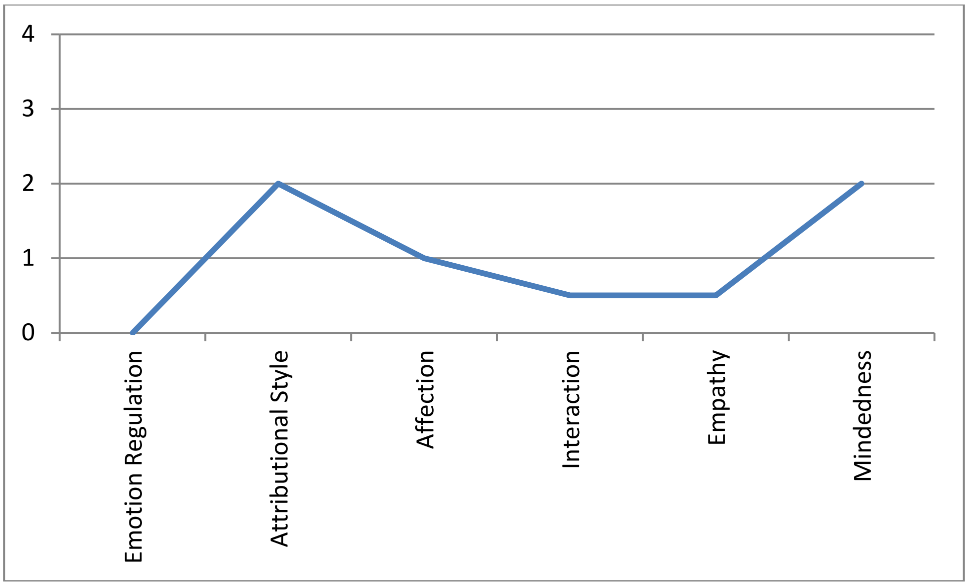
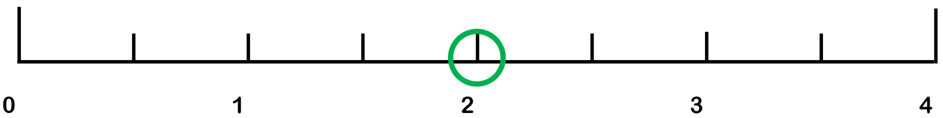


Figure 11. *Emily's emotional caregiving skills as measured by the INCAS.*

Attributional Style

0 Malevolent intent is attributed to the infant, with the infant blamed for difficulties faced during task completion.
1 Difficulties faced during task completion are largely attributed to the infant.
2 Difficulties faced during task completion are attributed to environmental or situational factors, or otherwise the locus of attribution is not indicated.
3 Difficulties faced during task completion are either attributed to extraneous factors or to the mother herself.
4 The mother is apologetic or expresses responsibility for difficulties faced during task completion and associated consequences for the infant.



Within the INCAS, *attributional style* refers to a mother's response to difficulty in terms of where she locates the problem. Although flustered and anxious while bathing the infant, Emily's dialogue did not indicate a blaming stance towards him. When the infant wet his nappy after the bath, she said "Uh oh, we'd better change you!" Similarly, when his foot become stuck in his grow-suit while she was dressing him, she said "Oh no, stuck!" In all cases, it was clear that she did not hold the infant responsible for the difficulties that were occurring throughout caregiving. As Emily was neutral in her attributional style, she received a score of 2 on this dimension.

Mindedness

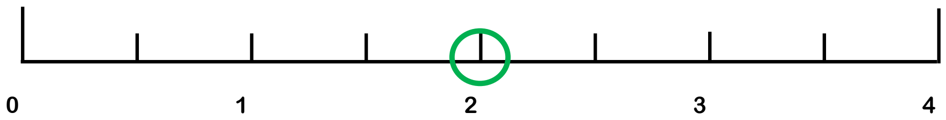
0 There is no mental state language, or when used, almost all of the mother's mental state language inappropriately reflects the infant's inner states, experiences and processes. Where mental state language is used, the infant's mind is not only misread by the mother, but is at times also distorted.

1 There is almost no mental state language, or when used, much of the mother's mental state language inappropriately reflects the infant's inner states, experiences and processes.

2 Some of the mother's vocalisation consists of mental state language. This mental state language at most times appropriately reflects the infant's inner states, experiences and processes.

3 Much of the mother's vocalisation consists of mental state language. This mental state language at most times appropriately reflects the infant's inner states, experiences and processes.

4 Most of the mother's vocalisations consist of mental state language. This mental state language seems to appropriately reflect the inner states, experiences and processes of the infant.



Emily also displayed skill in the area of *mindedness*. Throughout the procedure, she made seven comments about her infant's subjective experience. Of these comments, five seemed to appropriately reflect his inner state, while two did not seem to do so correctly. An example of an appropriate infant-directed mental state comment occurred when Emily was lifting him from the bath after realising that the water was too hot. At the time, he was startled and crying. Here, Emily commented "you are scared". A less appropriate mental state comment occurred when Emily was attempting to lower the infant back into the bath at a later point in time. He was crying after having been scalded on the first attempt. Here, Emily said "you are sad". Overall, she received a score of 2 on *mindedness*, as most of her infant-directed mental state comments (five of seven) seemed to accurately reflect her infant's experience. She did not receive a higher score, as only a small proportion (i.e.; "some") of her vocalisations consisted of mental state language.

Emily's *mindedness* score indicates that she understands the rudiments of her infant's emotional experience. While she understands what is happening however, she does not appear to understand how to manage his distress. This was reflected in her lower *emotion regulation*, *interaction* and *empathy* scores.

Emotion Regulation

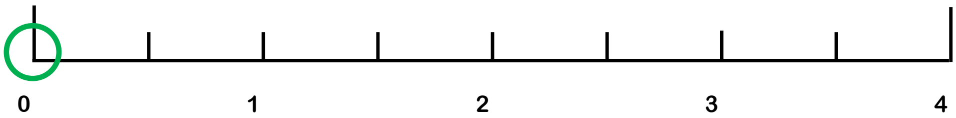
0 Adverse infant states are either ignored or not perceived by the mother, and infant is repeatedly overwhelmed and/or distressed throughout task completion.

1 Adverse infant states are not always perceived by the mother. Responding is inconsistent, and largely ineffective when it occurs.

2 Most adverse infant states are perceived by the mother, but are not correctly acted upon for the most part, or where correctly acted upon, soothing is not always performed promptly or effectively such that arousal is settled.

3 Adverse infant states are perceived by the mother and acted upon in a timely and effective fashion, such that infant dysregulation is minimal throughout task completion.

4 Mother guards against adverse infant states with mindful planning and effective and timely management where problems arise. Infant is rarely if ever dysregulated throughout task completion as a result of the mother's actions.



After lifting the infant from the hot bathwater, Emily did not alter her routine to accommodate his need for recovery. Support in the area of *emotion regulation* was thus a necessary target for intervention. Emily received a score of 0 for this dimension. She did not attend to the infant's state throughout caregiving and as a consequence, he was distressed for the duration. Her lack of responsivity suggested uncertainty regarding how to soothe infant distress. After the bath, Emily prioritised drying and dressing over soothing, which showed that she did not realise the importance of state modulation in overall infant care. By the time the infant was lifted to her shoulder after dressing, he had been crying and tensing his body for around 15 minutes. Within the context of this daily caregiving experience, the infant's more general state of fearful agitation could be better understood by the treating team.

Interaction

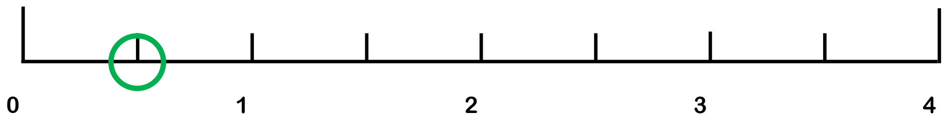
0 Infant's bids for interaction are consistently ignored or missed by the mother. The mother either attempts no engagement, or where she does, it appears intrusive, unwanted and/or unpleasant for the infant.

1 Infant's bids for interaction are often ignored or missed by the mother. The mother either engages infrequently, or where engagement is frequent, it often appears intrusive, unwanted and/or unpleasant for the infant.

2 Infant's bids for interaction are mostly met by the mother. The mother engages adequately with her infant, and her contact rarely appears intrusive, unwanted and/or unpleasant for the infant.

3 Infant's bids for interaction are consistently met by the mother. The mother engages frequently with her infant, and her contact seldom appears misattuned.

4 Infant's bids for interaction are consistently met by the mother. The mother engages frequently with her infant, and her contact never appears intrusive, unwanted or unpleasant for the infant. Infant is stimulated at an optimum level throughout caregiving.



Emily received a score of 0.5 for *interaction*, as most of the infant's communicative bids were missed and therefore not reciprocated. Prior to the upset, there had been a number of opportunities for enjoyable interaction. An example occurred while Emily was undressing the infant, during which time he repeatedly gazed at her face and directed cooing sounds towards her. His desired level of social stimulation was not provided for within the caregiving exchange.

Empathy

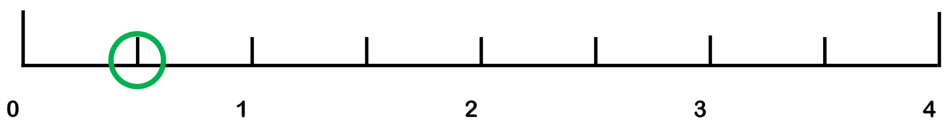
0 Mother is consistently rough and/or objective in her treatment of infant during task completion, appearing unconcerned with (or unaware of) the infant's subjective experience.

1 Mother is at times rough and/or objective in her treatment of infant during task completion, appearing only vaguely concerned with (or aware of) the infant's subjective experience.

2 Mother appears aware of infant's fragility and attempts to handle him or her gently during task completion. Any rough or uncomfortable treatment occurs as a result of physical error rather than emotional indifference to the infant's subjective experience.

3 Mother is gentle and respectful of infant for most of the time throughout task completion, appearing aware of and concerned for the infant's subjective experience.

4 Mother is gentle and respectful of infant at all times during task completion, demonstrating awareness of and concern for the infant's subjective experience. Mother at times takes extra measures to ensure that her infant is comfortable and happy throughout caregiving.



Emily received a score of 0.5 for *empathy*. That she left the infant on the bed with a towel over his face showed her lack of appreciation for his want to see her and feel connected. Emily's preoccupation with small details during dressing suggested that while she was highly concerned with completing the task correctly, she was not so concerned with her infant's subjective experience.

In all, it was concluded that Emily's growing sense of helplessness surrounded a difficulty with managing her infant's emotional needs. Her lower *emotion regulation* and *empathy* scores indicated that she was struggling to provide mirroring and containment. The infant's largely dysregulated state could be understood in terms of these unmet needs and his repeated experience of feeling overwhelmed and unsafe. Intervention aimed at helping Emily respond contingently to her infant formed an essential step in their adjustment together as a dyad. With heightened contingency, mirroring and emotional containment, her infant would come to learn that he is not alone with his states, and within this context, his ability to tolerate distress would begin to emerge. In Emily's case, her strong *diligence* could be embraced to support the intervention on less developed capacities. Intervention consisting of video feedback (using the assessment sample) to highlight the infant's experience of the bath would be the next step forward in assisting the dyad. It was difficult for Emily to attend to her infant's state while embroiled in the caregiving tasks. She had been determined to 'get things right' in a practical sense, to the exclusion of emotional care. In one way, this reflects Emily's high level of *diligence* and commitment to the role. This together with Emily's other caregiving strengths would be highlighted during video feedback to create a validating therapeutic climate. By increasing her awareness of physical and emotional states, Emily's infant-centred approach during caregiving could be enhanced.

With the INCAS in hand, it is possible for decision-making and intervention-planning to be based upon information that is relevant and complete, and therefore in the best interests of the dyad. It has been demonstrated within this section that from the standpoint of clinical management, the INCAS facilitates individualised understanding of a mother's functional capacity and with this, illuminates a starting point for intervention. Within Chapter 5, the psychometric properties of the INCAS will be examined in a pilot involving mothers from the healthy, mood disordered and schizophrenia populations.

Aims & Hypotheses

Study Aims

1) To develop and pilot an instrument that will validly and reliably assess the parenting capacity of postpartum mothers with schizophrenia and other serious psychiatric illnesses.
2) To compare the infant caregiving capacity of women with schizophrenia to that of clinical and healthy postpartum controls.
3) To compare the neurocognitive capacity of mothers with schizophrenia to that of clinical and healthy postpartum controls.
4) To compare the social cognitions of mothers with schizophrenia to those of clinical and healthy postpartum controls.
5) To determine the relative contributions of positive symptoms, negative symptoms, neurocognitive deficits and psychosocial factors upon the postpartum caregiving capacity of mothers with schizophrenia.
6) To examine the nature of the relationship between neurocognition, social cognitions, and early infant caregiving capacity.

Hypotheses

The Infant Caregiving Assessment Scales (INCAS)

Dimensionality

Hypothesis I) All proposed INCAS items will load adequately onto a single *infant caregiving* construct.

Hypothesis II) A two-factor solution will be identified that accounts for an adequate proportion of the variance in infant caregiving capacity between mothers. As suggested by the literature and clinical observation, two separable components of infant caregiving will emerge:

a. Instrumental caregiving

b. Emotional caregiving.

Reliability

Hypothesis III) INCAS Total, Emotional and Instrumental scale scores will each exhibit Cronbach's α values of greater than or equal to .8.

Hypothesis IV) Consensus between two independent raters on a shared sub-sample of INCAS assessments will be shown by high levels of inter-rater agreement.

Hypothesis V) Stability of the INCAS will be demonstrated by strong correlations between ratings taken one week apart on a sub-sample of mothers.

Validity

Hypothesis VI) There will be significant negative correlations between the INCAS and Parenting Stress Index (PSI) scores.

Hypothesis VII) There will be significant negative correlations between the INCAS and Camberwell Assessment of Need for Mothers (CAN-M) scores.

Hypothesis VIII) There will be significant positive correlations between the INCAS and Mind-Mindedness (MM) scores.

Hypothesis IX) The magnitude of the correlation between the INCAS and the Nursing Child Assessment Feeding Scales (NCAST) will be greater than that between the INCAS and the PSI.

Hypothesis X) The domains within the INCAS measure distinct aspects of caregiving capacity; *emotional* and *instrumental* caregiving.

a. The Emotional Domain will relate more strongly than the Instrumental Domain to the NCAST and MM.
b. The practical-caregiving CAN-M items will correlate more strongly with the INCAS Instrumental Domain, whereas CAN-M items concerning emotional aspects of parenting-related function will correlate more strongly with INCAS Emotional Domain scores.

Hypothesis XI) There will be a relationship between INCAS scores and study (and therefore diagnostic) group membership.

a. The schizophrenia group will exhibit lower INCAS scores than both of the control groups.
b. The clinical control group will exhibit lower INCAS scores than the healthy control group.
c. The INCAS will be able to predict study (and therefore diagnostic) group membership of mothers.

Hypothesis XII) The INCAS will be able to predict child protection intervention. Increased child protection intervention will be indicated by lower INCAS scores.

Hypothesis XIII) A positive linear relationship between Visual Analogue Scale (VAS) scores (in millimetres) and INCAS scores will be observed.

Hypothesis XIV) Concurrent validity will be demonstrated by strong agreement between the INCAS and the simultaneously administered NCAST, an established gold-standard measure of infant caregiving.

Hypothesis XV) Baseline INCAS scores will predict Bayley Scales of Infant Development (BSID-III) domain scores at one year postpartum.

Hypothesis XVI) Baseline INCAS scores will predict mother-infant attachment security (as measured by the Strange Situation Procedure; SSP) at one year postpartum.

Cognition and Schizophrenia

Hypothesis I) There will be a cognitive deficit within the schizophrenia group, relative to healthy and clinical controls. Specifically;

a. Postpartum mothers with schizophrenia will exhibit significantly lower neurocognitive scores than the clinical and healthy control groups.
b. Postpartum mothers with schizophrenia will exhibit significantly lower social cognition scores than the clinical and healthy control groups.

Hypothesis II) Where other significant predictors of parenting capacity are held constant, cognition will independently account for a significant proportion of the variance in early caregiving capacity, as indexed by the INCAS;

a. Neurocognitive deficits (associated with schizophrenia) will independently account for a significant proportion of impairment in postpartum parenting capacity.

b. Deficits to social cognition (associated with schizophrenia) will independently account for a significant proportion of impairment in postpartum parenting capacity.

Hypothesis III) There will be a mediating effect of social cognition upon the relationship between neurocognition and early caregiving capacity. It will be established through path analysis that neurocognition affects early infant caregiving capacity indirectly, via its influence upon social cognition. Specifically, a mediation model where neurocognition affects INCAS scores indirectly via its impact upon social cognition will fit better than a basic model where there are direct pathways between each cognitive variable and the INCAS.

Chapter 5: The Infant Caregiving Assessment Scales (INCAS)

This chapter describes the first phase of the study where participant intake took place, followed by the development and validation of the INCAS. Intake involved recruitment of participants, study group allocation in consultation with a diagnostic interview, and then a clinical and functional assessment of participants. The next stage involved development and validation of the Infant Caregiving Assessment Scales (INCAS), a novel measure of early infant caregiving capacity. The (INCAS) was developed and validated via a 12 month prospective longitudinal design. Findings are then presented regarding the psychometric properties of the INCAS, including its reliability (internal consistency, inter-rater and test-retest reliability) and validity (construct, criterion, face, concurrent and predictive validity).

Methodology

Ethical Approval

Ethical approval for this research was granted by the Sydney West Area Health Service Human Research Ethics Committee of (approval number: HREC2007/10/4.4(2674) AU RED 07/WMEAD/36). This research was also ratified by the University of Sydney Human Research Ethics Committee. In South Australia, ethical approval was granted by the Children, Youth and Women's Health Service Human Research Ethics Committee (approval number: REC2252/2/13).

Intake Phase

During the intake phase, postpartum participants were recruited. Two psychiatric sub-populations and a healthy control group were sampled, forming the following three study groups:

1) Index group: postpartum mothers with schizophrenia;

2) Clinical control group: postpartum mothers with a mood disorder;

3) Healthy control group: postpartum mothers without a psychiatric illness.

Procedure

The intake procedure was a multi-stage process. Participants were firstly identified and screened for eligibility (as outlined below). Eligible mothers were given an information and consent form which they read, signed in the presence of an independent witness, and returned to the investigator. Index and clinical control group mothers were supported through this process with the help of an independent health professional, family member or other carer. Eligible mothers were then screened for the presence of psychiatric illness (see Appendix 1 for purpose-built screening questionnaire).

Mothers who screened positively for schizophrenia or a mood disorder were invited to attend a diagnostic interview. During the interview, the treating team conducted a structured diagnostic assessment in accordance with DSM-IV criteria (APA, 1994). Mothers with a confirmed diagnosis of schizophrenia, bipolar disorder or major depressive disorder were included in the study, while mothers with other psychiatric diagnoses were excluded. In accordance with screening and diagnostic information, eligible participants were then allocated to one of the three study groups.

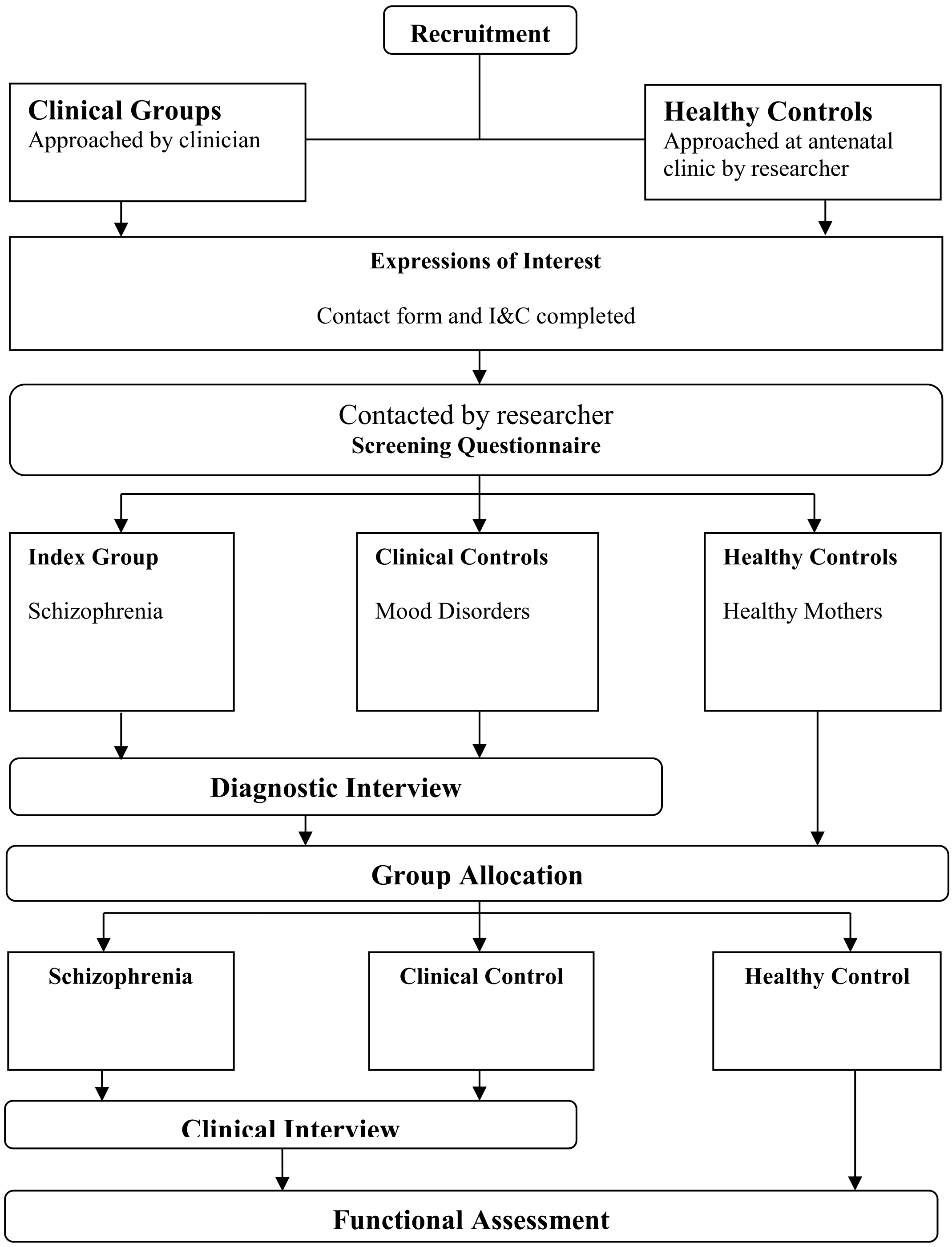


Figure 12. Intake procedure.

Mothers were recruited at any stage from pregnancy through to when their infants were 16 weeks old. At four weeks postpartum, participants were assessed for socio-demographic information, level of functioning and general psychological wellbeing. Mothers from the index and clinical control groups then attended a clinical interview, where their current psychiatric symptomatology was assessed. For a summary of participant flow through the Intake phase, see Figure 17 in Results section.

Recruitment

General inclusion/exclusion criteria

All participants satisfied the following eligibility criteria:

1) English literacy (sufficient to complete cognitive assessments)
2) 18 years of age and over
3) Biological mother of study infant
4) Residing with infant

Mothers were excluded from the study where any of the following were present:

1) History of a head injury (loss of consciousness > 60 minutes)
2) Intellectual disability (IQ > 2.5 SD below average)
3) Diagnosis of epilepsy or other gross neurological disorder
4) Current illicit substance use
5) Infant: congenital, developmental, or other significant health condition, indicated by NICU admission, low birthweight, preterm birth (<37 weeks gestation), or other diagnosis.
6) Infant removed in conjunction with child protection proceedings.

Clinical groups

Identification & recruitment of clinical mothers

Mothers were recruited to the schizophrenia and clinical control groups on a sequential and voluntary basis. These mothers were recruited between 2008 and 2010. Eligible mothers were identified by their treating clinicians, who had been provided with information about the study by the investigator through scheduled talks and related mail-outs. Interested mothers were given a Participant Information and Consent form, which they completed and returned to their clinicians, together with a Contact Details form. Clinicians then returned the completed forms in postage-paid envelopes to the investigator and assessment sessions were scheduled. In all cases, clinicians ensured that any acute psychosis had been resolved prior to inviting their patients to take part in the study.

Clinical group recruitment sites

Recruitment was conducted locally within New South Wales and remotely in South Australia. Remote recruitment was incorporated to increase numbers in the clinical groups. The recruitment sites were as follows:

New South Wales

Westmead Hospital

Mothers were recruited both ante- and postnatally from the perinatal outpatient clinic of Westmead Hospital's Department of Psychiatry. This clinic services mothers living within the western suburbs of Sydney who suffer from serious psychiatric illness. Patients attend regular sessions, where they receive specialist psychiatric and psychosocial support across the perinatal period.

Mothers who experienced acute exacerbation of their symptoms during the postpartum period were admitted to the psychiatric inpatient unit of Westmead Hospital. After resolution of the acute phase of illness, these mothers were also approached to participate in the study, and assessments were conducted on the ward.

Charmian Clift Cottages

Charmian Clift Cottages (CCC) is a supported block of villas located in Blacktown, NSW. This service is funded by the Richmond Fellowship of NSW. CCC offers stable supported accommodation for homeless mother-infant and -child pairs who are affected by maternal psychiatric illness. During their stay, mothers receive educational, disability, vocational, and parenting support, which is delivered by a team of support workers with specialist knowledge and skills for this parenting group.

St John of God Healthcare

St Benedict's Parent-Infant Unit at St John of God Hospital in Burwood specialises in the care of mothers affected by serious psychiatric illness during the perinatal period. This service offers an evidence-based treatment program which includes individual and group counselling for the improvement of family relationships, parent-infant attachment, sleeping difficulties, anxiety and anger management, medication use and parent-craft skills.

South Australia

Women's and Children's Hospital

The Perinatal and Infant Mental Health (PIMH) team at the Women's and Children's Hospital in Adelaide provide a mental health service to women and their infants antenatally and until the infants are three years of age. This team services patients identified as suffering from severe mental illness in the antenatal and postnatal hospital clinics, which provide obstetric and postnatal health services to around 5000 deliveries each year.

Helen Mayo House

Helen Mayo House (HMH) is a six-bed bed acute mother-baby inpatient admission unit which serves all of South Australia for women with serious psychiatric illness with infants up to three years of age. It is located in Glenside, SA.

Table 6. Participants (N) from each Recruitment Site

Recruitment site		**Study Group**	
	Schizophrenia	Clinical Control	Healthy Control
NSW			
Westmead Hospital	8	12	25
Charmian Clift Cottages	2		
St John of God Healthcare	1		
SA			
W&C Hospital	1		
Helen Mayo House	1	1	
Total	**13**	**13**	**25**

Diagnostic Interview

Diagnosis at intake was confirmed against DSM-IV criteria (APA, 1994). During the diagnostic interview, the psychiatric treating team drew upon current assessment information, past medical records and primary carer information to establish the diagnostic status of each participant. The NSW treating psychiatrists were two senior clinicians, one with expertise in the area of perinatal psychiatric illness, and the other a recognised authority in schizophrenia research and early intervention. The treating team in South Australia conducting diagnostic interviews for the study included two senior clinicians, a psychiatrist with expertise in perinatal psychiatric illness, and a clinical psychologist.

Group 1: Schizophrenia

Group 1 (index) comprised women with a confirmed diagnosis of schizophrenia.

Group 2: Mood Disorders

Group 2 (clinical control) included women with a confirmed diagnosis of a Major Depressive Disorder or Bipolar Disorder (Types I & II), according to DSM-IV criteria (APA, 1994). This group was included to control for: 1) the impact of postpartum preoccupation and fatigue upon cognitive performance, 2) the effect of psychotropic medication on maternal function, and 3) the socio-economic and functional impairment that often accompanies a serious psychiatric illness. In this way, the effects of schizophrenia upon early parenting capacity were examinable in isolation of the above confounders.

Group 3: Healthy Control Group

Group 3 (healthy control) comprised women without a diagnosed psychiatric illness. This group was included to control for the impact of postpartum preoccupation and fatigue upon cognitive performance.

Healthy Control group inclusion criteria

Mothers in the healthy control group (Group 3) satisfied the following criteria in addition to the general inclusion criteria:

1) no diagnosed psychiatric illness
2) no history of psychosis
3) no history of past psychiatric illness episode requiring psychotropic medication

A healthy control group was included to control for the impact of postpartum preoccupation and fatigue upon cognitive performance. In this way, the effects of a serious psychiatric illness upon early parenting capacity were examinable.

Healthy control group recruitment site

The Women's Health Clinic of Westmead Hospital provides antenatal outpatient care to women residing within the Western Suburbs of Sydney, NSW. The clinic services both privately insured and Medicare patients. In an attempt to match groups as closely as possible for SES, recruitment was conducted on days reserved for publicly funded mothers of healthy pregnancies.

Healthy control group recruitment procedure

Women delivering an infant between 2008 and 2010 were approached on a consecutive basis and invited to participate in the study. Fliers (see Appendix 2) were handed out to pregnant mothers while they waited to attend their antenatal appointments at the Women's Health Clinic of Westmead Hospital. Interested mothers were given contact forms to fill in and return to the investigator.

Information and Consent forms were then posted out to these mothers. Mothers then confirmed their interest in the project by signing and returning the consent forms in the postage paid envelopes which had been provided. These mothers were then assessed for eligibility over the phone.

Instruments

Clinical and functional assessment tools are detailed below (Table 7).

Table 7. Intake Phase Assessment Protocol

Assessment Point	Session	Content	Measures & sources		Infant age (months)
			Schizophrenia	Healthy Control	
Recruitment			Screening I&C	Screening I&C	Ante- or postnatal
Diagnostic interview	1	Confirmation of diagnosis	Structured clinical interview information Case notes Past medical records Clinician information		Ante- or postnatal
Clinical interview	2	Symptom severity	PANSS MRS CDSS LUNSERS Cpz eq.		1-4
Functional assessment	3	Everyday living & parenting	SD CAN-M WHOQOL IPRI DASS	SD CAN-M WHOQOL IPRI DASS	1-4

I&C: Information & Consent; PANSS: Positive and Negative Syndrome Scales for Schizophrenia; MRS: Mania Rating Scale; CDSS: Calgary Depression Scale for Schizophrenia; LUNSERS: Liverpool University Neuroleptic Side Effects Scale; Cpz eq.: Chlorpromazine equivalence; SD: Socio-demographic Questionnaire; CAN-M: Camberwell Assessment of Need for Mothers; WHOQOL: World Health Organisation Quality of Life – Short Form; IPRI: Interpersonal Relationships Inventory; DASS: Depression, Anxiety and Stress Scales.

Positive and negative symptoms

Positive and Negative Syndrome Scale (PANSS)

The Positive and Negative Syndrome Scale (PANSS) was used to measure psychotic symptomatology in the schizophrenia group. The PANSS is a 30-item clinician-rated assessment for patients with schizophrenia (Kay et al., 1987). The assessment is based on a semi-structured interview which takes approximately 40-50 minutes to complete. The PANSS yields four scales which quantify the severity of positive and negative syndromes, the syndrome differential, and general illness severity. Scores are based on 30 items, each rated on a seven-point scale. Each PANSS item is accompanied by a complete syndrome definition, together with detailed anchoring criteria for seven rating points which represent increasing levels of psychopathology (ie; 1=absent, 2=minimal, 3=mild, 4=moderate, 5=moderate-severe, 6=severe, and 7=extreme) (Kay et al., 1987). Within the current study, the Positive and Negative subscales of the PANSS were administered to the schizophrenia group (example items displayed in Appendix 3).

Earlier research has shown the four PANSS scales to be normally distributed, reliable and stable among a population of adults with schizophrenia (Kay et al., 1987). PANSS Reliability training is available in Australia. The current investigators were trained raters. Within this study, the α coefficients for the Positive and Negative Scales were .92 and .89, respectively.

Mania

Mania Rating Scale (MRS)

The Mania Rating scale (MRS) (Young, Biggs, Ziegler, & Meyer, 1978) was used to measure symptoms of mania in the clinical control group. The instrument comprises eleven items, each anchored by five detailed grades of severity. The items are based on the core symptoms of the manic phase of bipolar disorder. The scale was administered by a trained clinician during a 15 to 30 minute interview. A severity rating is assigned to each of the eleven items, based on the patient's subjective reports of his or her condition over the previous 48 hours, together with the clinician's observations throughout the interview (Young et al., 1978). A total score is calculated by summing each of the item scores (list of items displayed in Appendix 4). Original validation data demonstrated that the tool is valid, sensitive, and reliable (Young et al., 1978). Within the current sample, internal consistency of the scale was adequate ($\alpha = .82$).

Depression

Calgary Depression Scale for Schizophrenia (CDSS)

The CDSS was used to measure depression in the mothers with schizophrenia. The CDSS is an observer-rated assessment of depression, designed specifically for use in schizophrenia populations (Addington et al., 1990). This instrument was administered with the schizophrenia group as a secondary measure of depressive symptoms. Unlike other measures of depression, which tend to overestimate depression in patients with schizophrenia, the CDSS detects depression separately from the negative syndromes of schizophrenia (Addington et al., 1996). The CDSS interview comprises eight structured questions and one global observation-based item. Items (listed in Appendix 4) are rated on four-point scales, each anchored by descriptors. Within the current sample, internal consistency of the CDSS was found to be relatively poor (Cronbach's $\alpha = .52$).

Depression Anxiety and Stress Scales (DASS)

The DASS is a 42-item self-report measure of depression-related symptomatology (Lovibond & Lovibond, 1995). The DASS was used to measure depression, anxiety and stress across all participant groups. The DASS generates three scale scores which measure the related negative emotional states of depression, anxiety and stress. For each symptom-describing item, participants rate the extent to which the symptom was experienced over the past seven days on a 4-point severity/frequency scale ranging from 'Did not apply to me at all' to 'Applied to me very much, or most of the time'. Scale scores are calculated by summing the relevant items. Within the study at hand, the internal consistency of the DASS was strong, with α coefficients of .96, .94 and .97 for the Depression, Anxiety and Stress scales, respectively.

Medication and side-effects

Liverpool University Neuroleptic Side Effect Rating Scale (LUNSERS)

The LUNSERS was used to measure the severity of side-effects that are known to result from psychotropic medication use (Day, Wood, Dewey, & Bentall, 1995). This self-report tool lists 41 side-effects and 10 'red herring' items (e.g.; hair loss, chilblains) which are rated on a 5-point frequency scale in relation to the past month (Appendix 5). The red herring items are included to identify individuals who tend to overscore on self-report measures of medication side-effects. The LUNSERS was administered to the schizophrenia and clinical control groups to investigate medication side-effect profiles. Within the study at hand, internal consistency of the scale was good (α = .94).

Chlorpromazine Equivalence

Chlorpromazine (Cpz) equivalence was used to estimate the dose of antipsychotic medications, using chlorpromazine as a standard. Cpz equivalence was based originally on measures of dopamine D2 receptor blockade (Seeman et al., 1976), but also empirically from double-blind studies. In these studies, clinicians determined the amount of each antipsychotic drug that was necessary for optimal antipsychotic effects, relative to chlorpromazine (Gardner, 2010) (adapted Cpz equivalence table displayed in Appendix 6).

Function

Socio-economic status

Socio-Demographic Questionnaire

A purpose-built self-report questionnaire was used to collect socio-demographic information. The tool contained items relating to:

1) Basic psychosocial and demographic information

2) Obstetric and infant data pertaining to index child

3) The mother's medical and psychiatric history

4) Family psychiatric history

The questionnaire comprised 44 items, with response modality varying between likert-style, true/false, and free-flow responses (displayed in Appendix 7).

Maternal role functioning

Camberwell Assessment of Need – Mothers (CAN-M)

The CAN-M is a standardised interview-style assessment tool which was chosen to evaluate the complex needs of pregnant women and mothers with serious psychiatric illness

(Howard et al., 2007). The CAN-M explores parenting-related needs and functioning from both subjective and objective points of view. As well as collecting basic information, the tool also measures the level of concordance between patient and clinician in their estimation of the parenting situation.

The CAN-M covers 26 domains of parenting-specific need which relate to issues of basic functioning, violence and abuse, parenting and caring responsibilities, social and economic status, physical health, life skills, ethnicity and culture, substance misuse, and risk assessment. Taken together, items act as an indicator of the mother's quality of life and level of functioning in the context of the parenting role. CAN-M domains of need, together with sub-scores generated for the study at hand are listed in Appendix 8.

The CAN-M is scored such that higher numbers represent increasing levels of need. The response options are: 0 (no need); 1 (met need); 2 (unmet need), and 9 (unknown level of need). For the sake of statistical analysability, 9 was not included as a response option within the current study. In this way, data were ordinal, and thus able to be conceptualised and analysed as such.

The tool's reliability was originally established within a sample of 36 service user-staff pairs. This sample included people with schizophrenia and other psychotic disorders, depression, bipolar, anxiety, and personality disorders (Howard et al., 2007). During validation, the CAN-M correlated with other established measures of functioning and need (Howard et al., 2007).

Quality of life

World Health Organisation Quality of Life assessment (Brief form) (WHOQOL-BREF)

The WHOQOL BREF was selected to measure subjective quality of life. The WHOQOL-BREF is an abbreviated version of the WHOQOL-100 (Murphy, 2000).The

WHOQOL-BREF comprises one item from each of the 24 facets contained in the WHOQOL-100, plus two items from the overall quality of life and general health facets. As such, the WHOQOL-BREF is a 26 item measure. Participants rate their self-perceived quality of life in terms of four related domains: physical health, psychological health, social relationships, and environment (content summarised in Appendix 9). Items are rated on five-point Likert scales.

The WHOQOL-BREF was originally field-tested within two Australian studies (Murphy, 2000). The Victorian Validation Study (VVS) reported on a stratified sample of Victorian residents which covered a broad range of health conditions ranging from full health to terminal illness. The Longitudinal Investigation of Depression Outcomes (LIDO) Study reported on depressed and well individuals on a multi-centre, cross-national basis (Herrman, Patrick, et al., 2002). From this study, the Australian-based data were used to assess the psychometric properties of the Australian WHOQOL-BREF.

More recently, the WHOQOL-BREF has proven a valid and reliable measure for use in psychotic populations (Herrman, Hawthorne, & Thomas, 2002). Importantly, the WHOQOL-BREF has been widely used in studies involving participants with schizophrenia e.g. (Alptekin et al., 2005; Norholm & Bech, 2006; Sim, Mahendran, Siris, Heckers, & Chong, 2004; Ulas, Akdede, Ozbay, & Alptekin, 2008; Wegener et al., 2005; Williams et al., 2008). Within the current study, the instrument was found to have reasonable internal consistency for the Physical domain (α= .70), and strong internal consistency for other quality of life domains (.84 for Psychological; .84 for Social Relationships; .81 for Environment).

Relationship functioning

Interpersonal Relationships Inventory (IPRI)

The short form of the IPRI was used in this study to measure participant relationship functioning. The IPRI Short Form contains 26 items which combine to yield two scale scores, Support and Conflict. Items are responded to on a five-point likert scale, with scale scores calculated by summing relevant item scores. The Social Support subscale contains 13 items. These questions measure the perceived availability of helping behaviours by people within the participant's network. E.g.; '*There is someone I can turn to for helpful advice about a problem'.* The Conflict subscale (also 13 items) examines the perceived level of discord or stress within the participant's key relationships. Conflict is indicated by both the presence of unhelpful behaviours and the absence (e.g.; withholding of) supportive behaviours. E.g.; '*Some people in my life are too pushy'; 'There is someone I care about that I can't count on'.* Conceptually, items require two different anchor styles: agree-disagree (items 1 to 14), and often-never (items 15 to 26).

In addition to the above items, the IPRI contains a section where participants list each person in their social network, thus eliciting the total number of social supports, together with the nature of the relationship with each person (e.g.; sister, friend, parent). The final section contains demographic questions, however this was not administered due to redundancy within this study.

The initial validation study was conducted on a varied population which included students, healthcare patients, shelter residents, pregnant women and women from the wider community (Tilden, Nelson, & May, 1990). Within the study at hand, internal consistency was found to be good, with α coefficients of .94 for the Support scale and .85 for the Conflict scale.

INCAS Validation: The Infant Caregiving Assessment Scales (INCAS)

Design

Validation of the INCAS (Phase 2) incorporated a 12 month prospective longitudinal design, which occurred in three stages (outlined below). Firstly, the instrument was conceptualised and formulated. Next, the instrument was piloted on a sample of postpartum mothers across the first 12 months of the parenting relationship. Finally, the data were analysed and the instrument's psychometric properties were evaluated. All three study groups participated, such that the tool was piloted on samples of postpartum mothers from healthy, mood disordered, and schizophrenia populations. Please see Appendix 10 to preview the INCAS in full.

The Infant Caregiving Assessment Scales (INCAS)

The INCAS is a process-oriented, dimension-referenced observational tool that indexes the practical and emotional capacities of mothers as they deliver care to their new infant. The instrument includes task-related flowchart inventories and a set of global likert-style scales.

INCAS procedure

In a naturalistic setting, mothers are filmed as they complete the core daily tasks essential to basic infant care. Participants are instructed to bathe, dress, feed and change their infant. To enhance ecological validity, caregiving is filmed in the home where possible. Dimensions are indexed by specific behaviours which are captured as the caregiving tasks are completed. Footage is rated by trained raters, firstly task-by-task with the flowcharts, and then at a global level using the dimension scales. Each dimension is scored along a seven-point scale. A Total score is obtained by summing individual dimension scores. Instructions for administering the INCAS[1] are as follows:

> Step 1. Build rapport. Show interest in the patient and her infant, communicating your intention to work collaboratively towards achieving an enjoyable and successful parenting experience.
>
> Step 2. In a naturalistic setting (ideally the home environment) film the mother as she completes the core tasks of caring for her infant. Tasks can be completed in any order, depending upon the needs of the dyad.
>
> Step 3. Back at your place of work, review the footage in total before commencing the rating process.
>
> Step 4. Review the footage a second time in consultation with the task-specific flowchart inventories. This will help to focus your attention onto the mother's *task-related* capacity. Rate the checklists as you go along, adding extra information where needed.
>
> Step 5. Review the completed checklists, paying attention to ordering of sub-tasks and any difficulties that the mother encountered. Think about the dimensions and the areas of parenting from which task-related difficulty originates.
>
> Step 6. In *close consultation with rating criteria*, score the mother's overall capacity on each of the global dimensions.

Flowcharts

Flowchart inventories provide a detailed checklist of task-related sub-steps. There is the option to rate subtasks as either present or absent, and space beneath each flowchart for the inclusion of clarifying information. The flowcharts detail aspects of the mother's task-related performance, including sequencing, accuracy and inclusion of sub-tasks. In addition to eliciting a fine-grained analysis of caregiving quality, flowcharts ensure that scores reflect ability-related capacity with minimum clinical bias. The following example is provided:

[1] Instructions (esp. step 1) are geared towards therapeutic use of the tool. No intervention was conducted with study dyads.

Steps for Dressing a New Infant:

Present	Absent	Step
☐	☐	Prepare by setting out a clean nappy, any creams or powders as needed, baby wipes, a singlet and bodysuit .
☐	☐	First put on the nappy to avoid impending 'mess' (refer to appropriate flowchart).
☐	☐	Next put the singlet on. With baby lying flat on the change table, stretch the neck of the singlet open. Supporting the head, put the singlet on from the back, avoiding the face as you pull the front down over the head.
☐	☐	Gently thread each arm through the arm holes.
☐	☐	Lift baby off change table and hold securely in one arm against your body.
☐	☐	Lay the opened bodysuit on the changing surface with your free hand.
☐	☐	Supporting the head and back, gently replace baby onto opened suit.
☐	☐	Gently thread arms and legs through sleeves and feet of the suit. Do not tug on baby's limbs. Instead, shuffled the sleeves and legs along the arms and legs until they are in place.
☐	☐	Fasten studs or buttons.
☐	☐	If the bodysuit does not have feet built in, cover baby's feet with socks or soft footwear.

Focus
Never leave baby unattended on the change table.

Protection
If you must turn your back, do so only while holding one hand on baby's body.

Empathy & State Modulation
If baby becomes distressed it can help to take the time to pause, pick baby up and cuddle until soothed.

Draft only

Comments/additional information:

Rating Scales

The global scales assess dimensions of early caregiving which relate to healthy infant outcomes. Dimensions encapsulate the diverse spectrum of parenting behaviours that contribute to infant development.

The literature delineates two aspects of early caregiving which influence infant development; *Instrumental* care describes behaviours that promote the safety, consistency and material adequacy of the early nurturing environment. The physical development, hygiene and health of a developing infant are affected by the quality of instrumental care. *Emotional* care involves those aspects of early parenting that promote the infant's psychological (emotional and cognitive) functioning and development.

Provisional Instrumental (i) dimensions include:

- i1. Protection
- i2. Provision
- i3. Diligence
- i4. Proficiency
- i5. Focus
- i6. Strategy
- i7. Management
- i8. Precision
- i9. Adaptability
- i10. Maternal self-efficacy

Provisional Emotional (e) dimensions include:

- e1. State modulation
- e2. Locus of negative attribution
- e3. Affection
- e4. Interaction
- e5. Empathy
- e6. Mindedness

Table 8. Proposed INCAS Caregiving Dimensions

	Dimension	Description
Instrumental (i)		
i1	Protection	Safety, harm minimisation, hygiene and health-promoting behaviours.
i2	Provision	Meeting basic material needs required to bathe, clothe, dress, feed, and shelter new infant.
i3	Diligence	Effort, conscientiousness, thoroughness, commitment to task completion.
i4	Competence	Skill, knowledge, ability.
i5	Focus	Task-oriented attenuation, vigilance.
i6	Planning	Task-related planning and preparation.
i7	Holding	Physical handling & control.
i8	Precision	Accuracy & sequencing.
i9	Adaptability	Responsivity & flexibility.
i10	Maternal Self-efficacy	Task-specific confidence, initiative & autonomy.
Emotional (e)		
e1	Emotion regulation	Soothing, settling, buffering, tempering of arousal, affective attunement.
e2	Attributional style	Extent to which infant is held accountable for adverse events during task completion, as indicated verbally by mother.
e3	Affection	Warmth, mood, tone.
e4	Interaction	Adequacy and contingency of social stimulation & communication with infant.
e5	Empathy	Concern for subjective experience of the infant; extent to which caregiving is gentle, child-centred, considerate.
e6	Mindedness	Understanding of infant's experiential & intentional stance, evidenced in mother's correct verbalisation(s) of her infant's mental experience.

Dimensions are anchored by four-point rating scales, with higher scores depicting greater parenting strength. Rating precision and variability are enhanced with the inclusion of halfway ratings between anchors. Detailed and specific anchoring criteria are elucidated within the tool. Examples are as follows:

Instrumental Caregiving (i)

i1_Protection

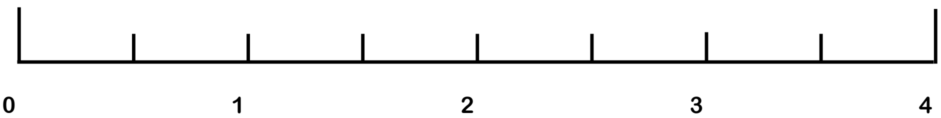
0 Mother fails to protect infant from harm and ill health. There are one or more instances whereby a clear risk of harm to the infant is apparent in conjunction with mother's behaviour.

1 Some protective behaviours are observed, however infant's safety and/or health are occasionally at risk in conjunction with mother's behaviour.

2 Mother adequately protects infant from harm and ill health. Mother's behaviour throughout caregiving does not compromise safety and/or health of the infant.

3 Mother displays a good ability to keep infant safe and healthy. Protective behaviours are often apparent throughout caregiving.

4 Mother demonstrates a superior ability to keep infant safe and healthy at all times. Protective behaviours are consistently apparent throughout caregiving.



Emotional Caregiving (e)

e1_Emotion Regulation

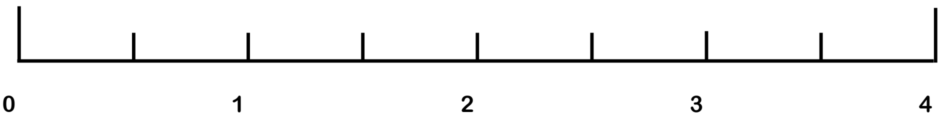
0 Adverse infant states are either ignored or not perceived by the mother, and infant is repeatedly overwhelmed and/or distressed throughout task completion.

1 Adverse infant states are not always perceived by the mother. Responding is inconsistent, and largely ineffective when it occurs.

2 Most adverse infant states are perceived by the mother, but are not correctly acted upon for the most part, or where correctly acted upon, not acted on quickly enough to prevent dysregulation.

3 Adverse infant states are perceived by the mother and acted upon in a timely and effective fashion, such that infant dysregulation is minimal throughout task completion.

4 Mother guards against adverse infant states with mindful planning and effective and timely management where problems arise. Infant is rarely if ever dysregulated throughout task completion.



Ratings were performed by research assistants who had been trained to administer and score the INCAS by the investigator. Training was comprehensive. As part of the rating process, 10% of assessments were re-rated by secondary raters. Any discrepancies between ratings were resolved daily by the investigator. All raters received feedback on scoring errors and additional training as needed. To prevent rater drift, ratings on two anchor assessments (scored by the investigator and each of the trained raters) were compared for agreement. Additionally, the first 5% of videos were re-rated by assistants after all other video's had been scored, and the agreement for each video between times one and two were calculated. Raters were given feedback where needed in order to prevent repetition of any errors, and to correct for scoring drift.

Instrument Development and Validation

Stage 1: Instrument development.

Development of the INCAS was a multi-step process (summarised in Figure 13 below). First, the construct to be measured (i.e. infant caregiving capacity) was defined and delimited. Literature reviews were conducted regarding: a) parenting capacity; b) parenting with a psychiatric illness; and c) infant development (see Chapters 1-3). In this way, the tasks of infant development, together with the required capacities of the primary caregiver, were identified. The literature was then examined for pre-existing parenting capacity assessments (Chapter 4). Existing instruments were examined to determine the extent to which they measured infant caregiving capacity adequately (i.e. such that the construct was represented in entirety by the measure). This information was used to guide decisions regarding the need for an additional instrument, together with the instrument's content, structure, rating criteria, scaling method and scoring. The relevance of each INCAS item to the construct of infant caregiving capacity was examined in consultation with a panel of experts, as well as through discussion with postpartum mothers who had been approached for the purpose of evaluating content validity. Interested postpartum mothers who attended the Women's Health Clinic of Westmead Hospital (n=8) were identified by nurses during follow-up visits and invited to provide feedback on the items. The expert panel comprised three psychologists (one developmental psychologist, two perinatal psychologists), seven psychiatrists (one infant psychiatrist, two perinatal psychiatrists, four child and family psychiatrists) and two perinatal and infant mental health nurses. Of these clinicians, most were academic title holders in addition to their clinical roles. All experts were familiar with the related literature. One of the psychiatrists was the clinical director of a mother-infant residential facility, while three others were the clinical directors of perinatal and infant mental health clinics. The feedback gained through consultation with these individuals was used to guide refinement of the INCAS.

The INCAS was then piloted on a sample of target mothers who satisfied the criteria set out during the Intake Phase. As elaborated below, validation data were collected across the first 12 months of the infant's life. With the data in hand, the instrument was evaluated in terms of its reliability and validity (outlined below). While beyond the scope of the current study, a final essential step in the validation process will involve subsequent independent verification and validation of the instrument. It will also be crucial to normalise the INCAS across a wider and more representative postpartum parenting population, as well as across different cultural groups.

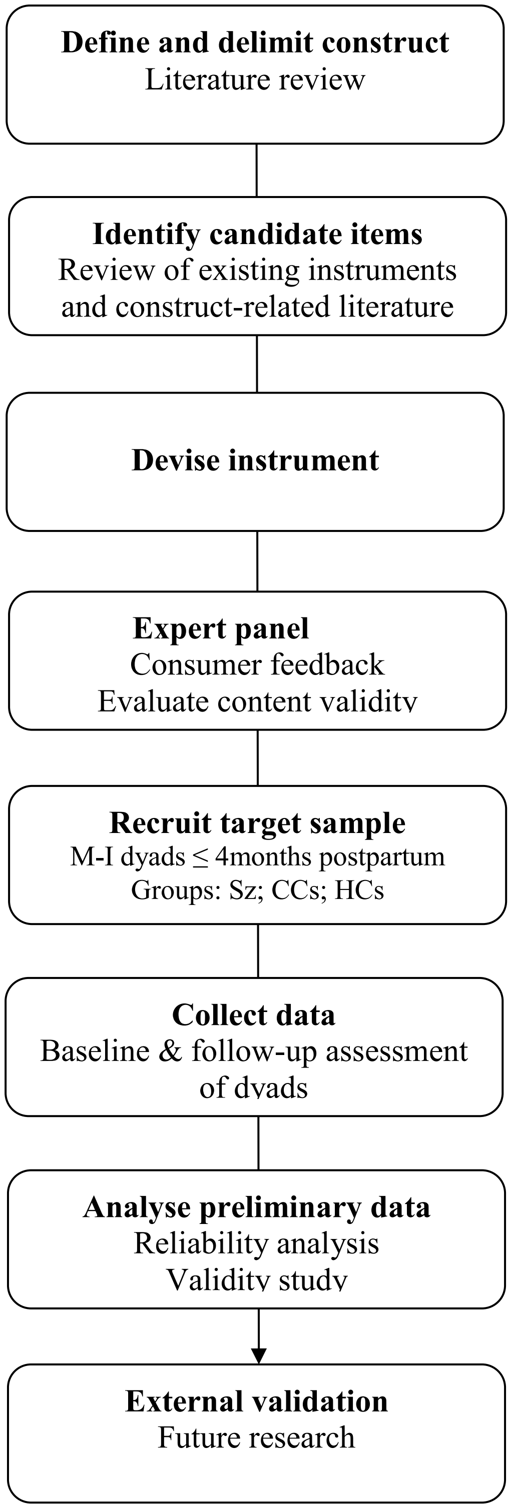


Figure 13. Instrument development.

Stage 2: Participant flow.

The validation involved four data collection points:

1. Baseline: Postpartum assessment of parenting capacity
2. Six month follow-up: Questionnaires completed via mail
3. Nine month follow-up: Questionnaires completed via mail
4. Twelve month follow-up:
    a. Questionnaires completed via mail
    b. Assessment of infant milestones and mother-infant attachment quality.

During baseline assessment, the INCAS was administered concurrently with a selection of well-established measures of early parenting capacity. During follow-up assessments, information on other clinically significant aspects of the early parenting experience was collected to monitor participant coping and wellbeing. During the 12-month follow-up assessment, developmentally relevant parenting outcomes were assessed. In this way, the predictive validity of the INCAS was assessed in terms of how well it was able to predict the known outcomes of early parenting at the end of the infant's first year.

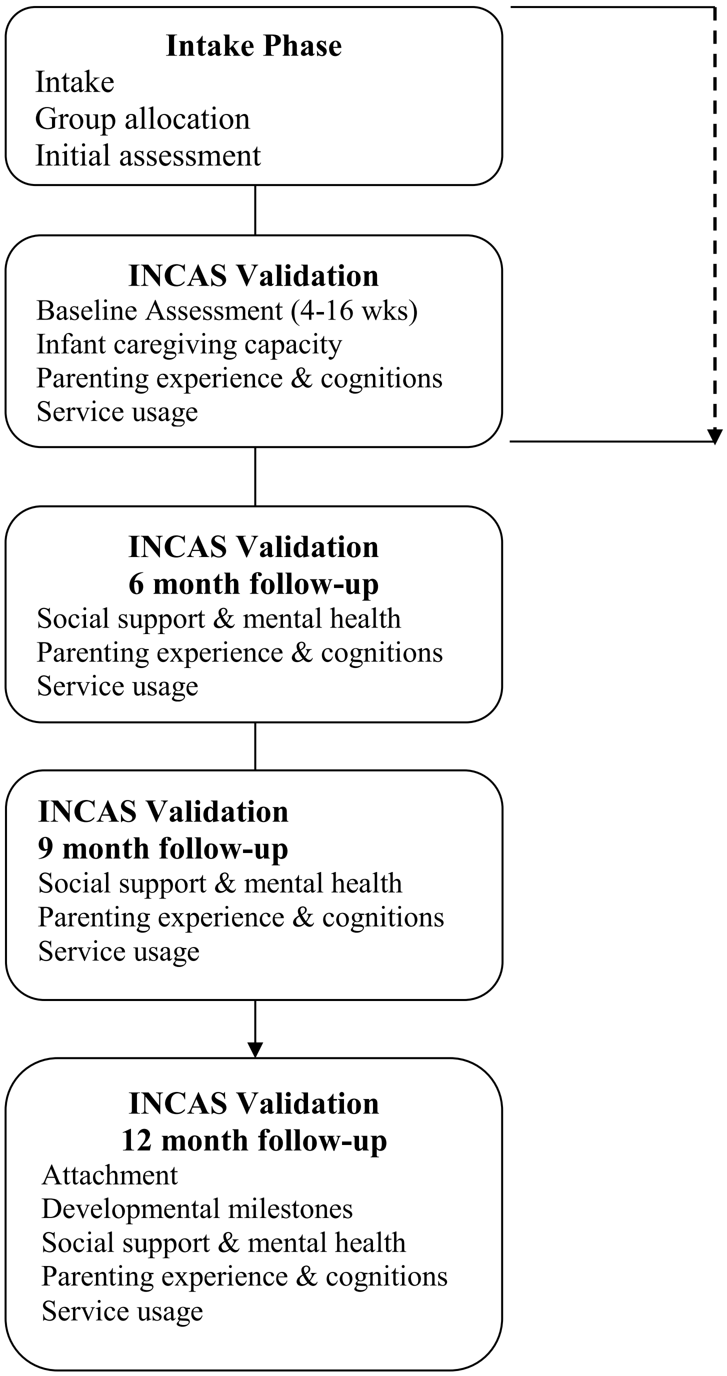


Figure 14. Participant flow through validation of the INCAS.

At all face-to-face assessment sessions across the year, mothers were evaluated for mental health status. During all face-to-face sessions, tests and assessments were curtailed wherever distress or fatigue in the mother or the infant became apparent. In these instances, further sessions were booked to complete any unfinished assessments. Upon completion of the study protocol, mothers were given a DVD which contained each of the interactions that had been filmed over the year, together with a certificate of appreciation.

Baseline parenting capacity assessment

Baseline parenting capacity assessment was conducted when infants were between four and 16 weeks of age. The time at which this first assessment point took place (with respect to infant age) varied between dyads according to differences in timing of clinical state for clinical group mothers, and also the time of entry into the study. For all dyads, baseline assessment took place a maximum of seven days after the Intake Phase had been completed.

During baseline assessment, filmed observational measures were used to assess the mother's capacity to care for her infant. Mothers were filmed by the investigator as they carried out predetermined caregiving tasks with their infants. The footage was then rated retrospectively. A JVC Everio GZ-MG575 camera was used. In order to capture the more subtle vocalisations between mothers and infants as they undertook the caregiving tasks, an external microphone was utilised. To enhance ecological validity and at the same time limit inconvenience to new dyads, sessions were conducted within the home setting where possible. In cases of extended postpartum institution-based care due to psychiatric illness, baseline assessment was conducted either on the hospital ward or within the relevant residential facility. Where symptoms were uncharacteristically severe (as confirmed by relevant treating clinicians), filming was delayed until the clinical state of the mother had improved, such that filmed interactions approximated everyday caregiving as closely as possible.

Baseline assessments took between 60 and 90 minutes to complete, depending on the time taken by each mother to complete the caregiving tasks. At the end of the baseline session, pen-and-paper self-report questionnaires were left with the mothers to complete independently and return via post to the investigator.

Follow-up assessments

Follow-up assessments were conducted at six, nine, and 12 months postpartum. These points were chosen so that follow-up was regular and evenly paced throughout the infant's first year and to reduce drop-out from the study, increasing the collection of longitudinal data. At each follow-up, mothers were posted a set of self-report questionnaires to complete and return in a postage-paid envelope. Questionnaires elicited information about the mother's psychological wellbeing, her perception of the quality and quantity of available social supports, and her subjective experience of the parenting role in relation to parenting stress and service engagement. Follow-up instruments are detailed below. The questionnaires were posted approximately two weeks prior to the infant's arrival at each assessment point. Where forms were not returned by approximately two weeks after the assessment point, a follow-up phone call was made to ensure that the mother had received the forms. Where forms had been received, assistance was offered to those mothers who were finding it difficult to complete the forms independently (most commonly encountered in cases of severe illness or acute symptomatology). According to the degree of difficulty being experienced, support ranged from over-the-phone assistance to additional home-visits, during which self-report forms were completed in-person with the mother. Where forms were not returned and the mother was not contactable, phone messages were left. Where two messages were left and not returned by the mother, it was assumed that the mother did not wish to continue, and a letter was sent to thank the mother for her participation and advise that she was welcome to call with any follow-up questions or concerns. Not all mothers participated in follow-up after completing the baseline phase of assessment. Many had to return to work and didn't have the time to continue on with the study, while others dropped out along the way due to illness, changed family circumstances or relocation. Mothers who had entered the study towards the end of the recruitment phase were only assessed for baseline measures due to time limitations on the investigator's part. By 12 month follow-up, the sample was around half its original size.

Infant outcomes

At 12 month follow-up, mother-infant pairs participated in a filmed onsite assessment of the attachment relationship using the Strange Situation Procedure (Ainsworth, 1985; Ainsworth et al., 1978). The infant's cognitive, communicative and motor capacities were evaluated using the Bayley Scales of Infant Development (Third Edition) (Bayley, 2006).

Stage 3: Validating the INCAS

With the data in hand, the INCAS was assessed for its psychometric properties, including:

- Reliability
    - Internal consistency
    - Inter-rater reliability
    - Test-retest reliability
- Validity
    - Construct
    - Criterion
    - Face
    - Concurrent
    - Predictive

Reliability analysis

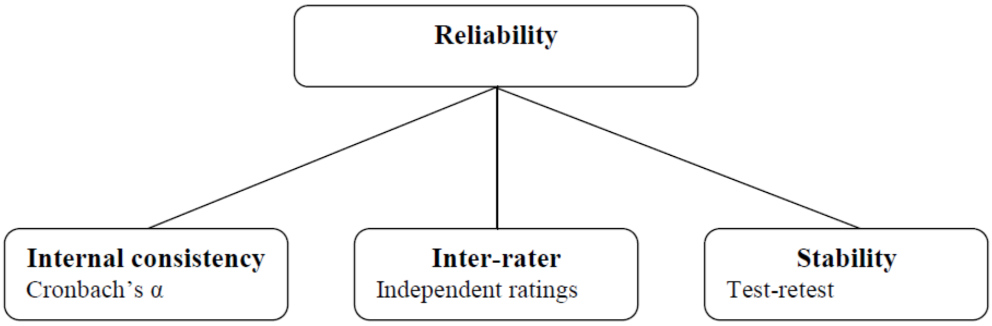


Figure 15. Reliability analysis

Internal consistency of items was examined using Cronbach's alpha coefficient, a statistic which provides an average of all split half estimates of reliability (Cronbach, 1951). Inter-rater reliability was determined by comparing 20% of assessments that had been re-rated by an independent trained rater.

The test-retest reliability (stability) of the INCAS was evaluated on a subsample of mother-infant pairs from the healthy control group, who were filmed repeating the designated caregiving tasks during a subsequent session. It was intended that the time between testing and re-testing was never longer than seven days (however as outlined in the Results section, this was not always the case). One week after baseline assessment, the selected dyads were visited a second time and asked to complete the caregiving tasks while being filmed once more. Both videoed sessions were then rated with the INCAS and compared for agreement. healthy control group mothers were selected to avoid the potentially confounding effects of fluctuating symptomatology upon test-retest stability.

Validity analysis

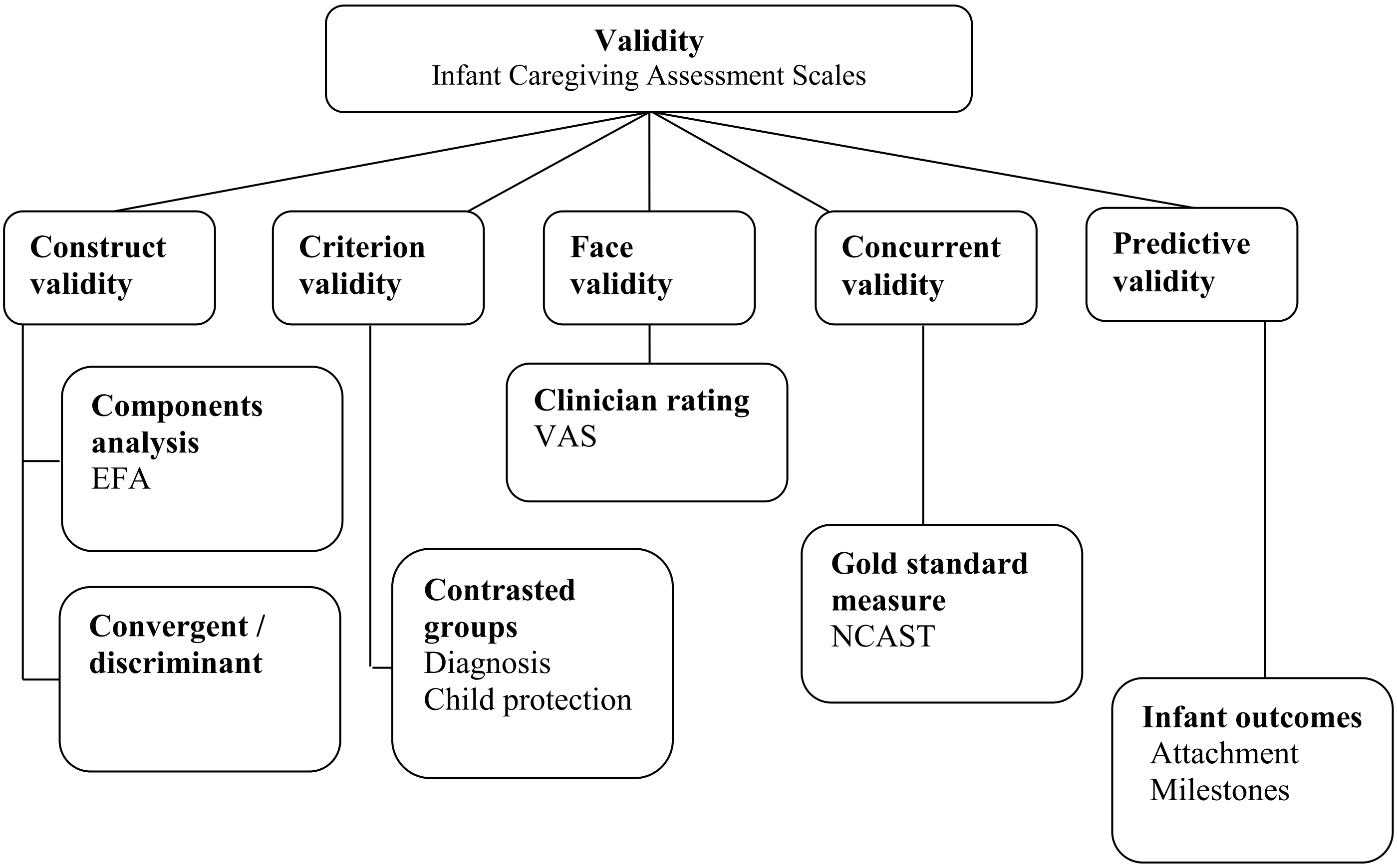


Figure 16. Validation study.

Construct validity

Construct validity was examined with an analysis of the instrument's principal components, together with its convergent and discriminant validity.

Components analysis

An exploratory factor analysis (EFA) with principle components analysis (with varimax rotation) was undertaken to examine the dimensionality of the construct of early caregiving capacity, as measured by the 16-item INCAS. It was anticipated that all proposed INCAS items would load onto a single infant caregiving construct. It was also expected that a two-factor solution would emerge, containing two domains of practical (i.e. instrumental) and emotional sub-components of caregiving.

Convergent and discriminant validity

Convergent validity was assessed by examining the extent to which INCAS ratings correlated with constructs that are theorised to relate to parenting capacity. These included:

- Parenting stress – measured using the Parenting Stress Index (Abidin, 1995)
- Parenting-related function – measured using the Camberwell Assessment of Need for Mothers (Howard et al., 2007)
- Awareness of the infant's mental experiences – measured using the Mind-Mindedness procedure (Meins et al., 2002)

Discriminant validity of the INCAS was established by comparing its correlation with the Parenting Stress Index (PSI) to its correlation with the Nursing Child Assessment Feeding Scale (NCAST-F)(Barnard, 1978). It was expected that the INCAS would relate more strongly to the NCAST-F, a measure of the mother's ability to interact with her infant whilst feeding, than the PSI, which measures the mother's stress in relation to her parenting role. Although parenting stress is a related construct, it is comparatively less similar than the quality of interaction during feeding.

On a Domain level, it was expected that the INCAS Emotional Domain would correlate more strongly than the Instrumental Domain with both the NCAST-F (Barnard, 1978) and the Mind-Mindedness procedure (Meins et al., 2002), both which quantify emotional caregiving capacities. As the INCAS is the first tool to measure practical caregiving in a systematic way, the Instrumental Domain was not able to be tested as rigorously as the Emotional Domain for its convergence with the practical caregiving sub-construct due to a poverty of existing measures of the same. However it was anticipated that the Instrumental Domain would correlate more strongly than the Emotional Domain with items on the CAN-M that measure practical domains of parenting functioning. It was expected that the Emotional Domain would correlate more strongly than the Instrumental Domain with CAN-M items measuring emotional domains of parenting functioning.

Criterion validity

An important aspect of the INCAS' criterion validity was its capacity to discriminate between groups. Discriminant validity was examined in terms of the tool's ability to: a) categorise participants into diagnostic groups who are known to differ in their early caregiving capacity, and b) distinguish between mothers who were engaged vs. not engaged with child protection services.

Face validity

Face validity was evaluated by comparing INCAS ratings with the impressions of perinatal clinicians who were naive to the instrument. These clinicians were asked to view the INCAS video footage and rate the caregiving capacity of each participant on a Visual Analogue Scale (VAS) (described below). VAS ratings were then compared to INCAS scores. In this way, the instrument's ability to evaluate parenting capacity was compared to the overall judgement of experienced perinatal clinicians.

Concurrent validity

The relationship between INCAS ratings and concurrently rated feeding interactions measured by the Nursing Child Assessment Feeding Scale (NCAST-F) (Barnard, 1978) was evaluated in order to demonstrate the tool's concurrent validity with gold-standard measures of early caregiving capacity.

Predictive validity

Important outcomes of early caregiving include the establishment of an infant-caregiver attachment relationship, together with the emergence of the infant's developmental milestones. It was expected that as a measure of early emotional and instrumental caregiving capacity, the INCAS would demonstrate a modest ability to predict mother-infant attachment classification (indexed by the Strange Situation Procedure; SSP) (Ainsworth, 1985 ; Ainsworth et al., 1978) and infant milestones (as indexed by the Bayley Scales of Infant Development; BSID-III)(Bayley, 2006) at 12 months postpartum. The instruments used in the validation process are summarised below (Table 9).

Table 9. INCAS Validation: Assessment Protocol

Assessment Point	Content	Measures Modality		Infant age (months)
Intake Phase	Intake, group allocation, initial assessment	(described above).		1-4
Validation Phase Baseline	Early caregiving assessment	INCAS VAS NCAST-F MM	In-home, filmed observation	1-4
		PSI PCQ	Self-report forms	
6 month follow-up	Social support, mental health, parenting experience, service usage	PSI PCQ IPRI DASS	Self-report forms	6
9 month follow-up	Social support, mental health, parenting experience, service usage	PSI PCQ IPRI DASS	Self-report forms	9
12 moth follow-up	Social support, mental health, parenting experience, service usage	PSI PCQ IPRI DASS	Self-report forms	12
	Infant milestones Mother-infant attachment relationship	BSID-III SSP	On-site, laboratory setting	

INCAS: Infant Caregiving Assessment Scales; VAS: Visual Analogue Scale; NCAST: Nursing Child Assessment Feeding Scale; GRS: Global Rating Scales of Mother-Infant Interaction; MM: Mind-Mindedness; PSI: Parenting Stress Index; PCQ: Parenting Checklist Questionnaire; IPRI: Interpersonal Relationships Inventory; DASS: Depression, Anxiety and Stress Scales; BSID-III: Bayley Scales of Infant Development (Third Edition); SSP: Strange Situation Procedure.

Validation Instruments

Early parenting capacity

For each observed early caregiving assessment, video footage was rated by an independent trained rater who was blind to maternal diagnosis and study group. For each filmed observational tool (including the NCAST-F and MM) 20% of the interactions were randomly selected and independently re-rated by a second trained rater, also blind to diagnosis and study group.

Visual Analogue Scale (VAS)

A VAS was used to provide a secondary index of global parenting capacity, as rated from the videoed INCAS caregiving tasks. The VAS consists of a horizontal line, 100mm in length, anchored by polarised word descriptors at each end. At one end, the lowest level of parenting capacity is indicated by the label "no capacity". The best possible rating is at the opposite end of the scale, and is labelled "highest capacity". The VAS is depicted below:

Overall, how would you rate the caregiving capacity of this parent?

No capacity |————————————————————| Highest capacity

Independent experienced perinatal clinicians were instructed to firstly view the caregiving footage, then rate the mother's capacity to deliver care, using the VAS. The clinicians were unaware of the INCAS scoring system, and blind to the diagnostic status of participants. Raters placed a mark at a point that they felt represented the mother's caregiving capacity, relative to the two extremes. The VAS was scored by measuring the distance (in millimetres) from the beginning of the line ('no capacity') to the rater's mark along the scale. This distance was expressed as a percentage.

Nursing Child Assessment Feeding Scale (NCAST-F)

The NCAST Feeding Scale is a gold-standard observational measure of caregiver-child interaction during feeding (including breast, bottle or solid feeding). The NCAST-F is reliable and valid for use with infants from birth to 12 months of age (Sumner, 1994). The NCAST-F comprises 76 items which are organised into six subscales.

Four of the six subscales describe parent contributions to the feeding exchange. These include:

1) Sensitivity to Cues
2) Response to Distress
3) Social-Emotional Growth Fostering
4) Cognitive Growth Fostering

The remaining two subscales describe infant contributions:

1) Clarity of Cues
2) Responsiveness to Caregiver

NCAST-F ratings were based upon filmed feeding exchanges that had been collected as part of the INCAS procedure. Footage was scored by an independent rater who had been trained and certified by the NCAST group. The rater was blind to the study group and diagnostic status of each mother.

The NCAST-F was chosen because of its proven ability to differentiate between various mother-infant clinical populations. Regarding infant populations, the NCAST-F has been shown to differentiate between preterm vs. term infants (Barnard et al., 1984), failure-to-thrive vs. normally developing infants (Sumner, 1994), and special needs, drug exposed, and premature infants, relative to healthy infants (Sumner, 1994). Regarding parenting groups, the NCAST-F has been shown to differentiate between depressed, stressed and unwell caregivers, relative to healthy controls (Barnard et al., 1988). Additionally, the tool is able to distinguish between caregivers with varying levels of education and intellectual functioning (Letourneau, 1997), age (Sumner, 1994) and drug abusing vs. abstinent status (Sumner, 1994). For a summary, see Mischenko (Mischenko, 2004).

Within the current study, only those dyads filmed completing a feed during their caregiving assessment session (n=36) were rated with the NCAST-F. This included five mothers with schizophrenia, 10 mothers in the clinical control group, and 21 mothers in the healthy control group. Internal consistency (Cronbach's alpha coefficients) of the six NCAST-F subscale scores ranged between .40 and .81, and between .64 and .86 on the three full scale scores (see Appendix 11 for full list).

Mind-mindedness (MM)

Mind-mindedness is a measure of the mother's ability to conceptualise and speak about her infant's mental processes. The Mind-Mindedness procedure (Meins et al., 2003; Meins et al., 2002) quantifies the extent to which mothers are able to understand and verbally reflect their infant's internal states during a filmed interaction. For this study, MM was rated from the videotaped caregiving interactions that had been collected as part of the INCAS procedure. MM ratings were conducted by an independent trained rater who was blind to the diagnosis and study group of each mother. The MM rating and scoring procedure (Meins et al., 2002) is detailed in Appendix 12.

In healthy populations, inter-rater reliabilities are found to range between 0.73 and 0.82 when the MM procedure is used (Arnott & Meins, 2007, 2008; Laranjo, Bernier, & Meins, 2008). A recent study (Pawlby et al., 2010) involving dyads affected by maternal schizophrenia, depressive illness and bipolar disorder utilised the MM procedure (Meins et al., 2002; Meins et al., 2003). Here, inter-rater reliability was 0.80.

Follow-up measures

Parenting Stress Index (PSI)

The PSI is a gold-standard measure of the stressors commonly associated with dysfunctional parenting (Abidin, 1995). The PSI is a self-report instrument containing 101 multiple choice items and a Life Stress Scale which contains a list of 19 'yes/no' items, each pertaining to a significant life stressor such as divorce, change of financial situation, or change of employment status. Items investigate the extent of the parent's self-reported experience of stress in relation to the dynamic with the child, characteristics of the child, characteristics of the parent, the family context, and stressful life events. The PSI yields a total score, three domain scores, and 15 subscales (displayed in Appendix 13).

Original data point to high internal consistency and test-retest reliability of the PSI. (Abidin, 1995). Few studies involving maternal schizophrenia have used this instrument. Where the PSI has been used, researchers have tended to use an altered 14-item version (e.g., Kahng, Oyserman, Bybee, & Mowbray, 2008; Mowbray, Bybee, Oyserman, & MacFarlane, 2005). In these cases, a Cronbach's alpha score of .86 was recorded. Within the current study, however, the PSI serves an important function in the validation process, so it was administered in its standard form.

Internal consistency (Cronbach's alpha coefficients) of the PSI subscale and full scale scores within the current sample are displayed in Appendix 13. The Cronbach's coefficients of Child Domain subscales ranged between .49 and .81, while the α scores of Parent Domain subscales ranged between .53 and .78.

Parenting Checklist Questionnaire (PCQ)

The PCQ is a purpose-built self-report questionnaire that assesses participant use of community, clinical, and social supports, custodial status, and self-perceived coping in relation to the early parenting role. The PCQ also contained questions relating to level of child protection intervention (Q11, below), used to index the child protection intervention status of each mother when examining the criterion validity of the INCAS. This instrument comprises 44 items, which were rated with a combination of multiple-choice scales, binary (yes/no; true/false), or free-flowing responses (see Appendix 14 for full version).

Q11: Is your family involved with a child protection agency at the moment?

□ No □ Yes

(a) If yes, what has been happening?

(e.g. court proceedings, meetings, home visits, respite, parenting program, supervision, out-of-home care)

____

____

(b) As a mother, what has this experience been like for you?

____

____

Twelve Month Outcome Measures

Developmental Milestones

Bayley Scales of Infant Development (Third edition) (BSID-III)

The BSID-III is a standardised behavioural assessment which measures the cognitive, language and motor function of infants and young children aged between one and 42 months (Bayley, 2006). The BSID-III was used in the current study to evaluate infant progression along expected developmental milestones. Of interest here was the extent to which early parenting capacity, as measured by the INCAS, accounts for variability in the emergence of developmental milestones in young infants.

The BSID-III comprises a series of items, in the form of standard play tasks, which were presented by the investigator in a uniform way. Through the use of structured observations, appropriate toys, and standard prompts by the assessor, the instrument elicits the infant's motor, communicative, personal, social and adaptive problem-solving competencies. The BSID-III quantifies the motor, language and cognitive development of infants with the use of six subtests, detailed in Appendix 15.

BSID-III testing procedure

Tests were conducted in a standard testing environment (a room within Westmead Hospital) that was free of distractions. The room was quiet, well-lit and comfortable. In line with the manual (Bayley, 2006), the room had enough space for infants to demonstrate gross motor skills such as crawling, walking and jumping. The investigator, infant and parent were in the room during testing. Each item was administered according to administration and scoring directions set out by the manual. A scoring record form was used throughout testing. For many of the play-based items, the parent helped to elicit the required responses from the infant. Tests took between 40 and 90 minutes to administer, with variations occurring in relation to specific strengths and limitations of each infant, together with test-session behaviour. Testing technique was adapted to the infant's needs, temperament and disposition. While every effort was made to administer all of the subtests within one session to infants, testing was stopped for a break, snack, or some cases, was split over two separate sessions where infants became fatigued, inattentive, restless and/or upset.

The Bayley III screening test was originally validated on a cohort of 1,675 children (Bayley, 2006). Validation information is available for varying infant health and developmental status (Bayley, 2006). There is no available information for varying status of the primary caregiver, apart from a subsample of infants with prenatal alcohol exposure. Within the current study, potentially confounding maternal and socio-demographic variables were controlled for. Additionally, gender-related effects (35% of the infants were boys) were explored within the current study. Significantly correlated variables were controlled for in subsequent analyses, reported in the Results section. Internal consistency of subtest scores within the current population can be viewed in Appendix 15.

Mother-infant attachment

The Strange Situation Procedure (SSP)

The Strange Situation Procedure (SSP) is a laboratory procedure that classifies the style of attachment between an infant and caregiver (Ainsworth, 1985; Ainsworth et al., 1978). The SSP was used within this study to examine mother-infant attachment. Of interest was the extent to which early parenting capacity, as measured by the INCAS, accounts for variability in the emerging attachment classification at one year postpartum.

In view of the importance of the attachment relationship to the infant's emerging mental health, SSP classifications were used to indicate an aspect of the infant's emotional development. The SSP is the current gold-standard measure of mother-infant attachment.

SSP procedure

The Strange Situation Procedure involves eight episodes of mother-infant separation and reunion within an unfamiliar (i.e. 'strange') playroom (summarised in Appendix 16). The mother and her infant are placed in an unfamiliar room. The mother (also the infant's source of comfort), is asked to leave the infant momentarily, a number of times. The first time the infant is left, an unfamiliar adult, the 'stranger', remains present. Following reunion, the second separation from the mother takes place and the infant is left alone. With each episode of separation and reunion, the infant grows increasingly sensitive to the mother's whereabouts, and in this way, the mother-infant attachment system becomes activated. The filmed footage is examined for predetermined patterns of behaviour during reunions (Ainsworth et al., 1978), and the relationship is categorised accordingly.

Setting

In line with the official procedure set out by Ainsworth (1978), the playroom had 3 x 3 meters of clear play space on the floor for the infant, where a variety of appealing, age appropriate toys were placed approximately 1.5 meters from the door. The room was carpeted, cheerful and comfortable, with two chairs for the stranger and the mother. The investigator managed the running of each procedure. This included operating the camera, prompting the stranger, coaching the mother, and timing each of the episodes carefully, in accordance with the specified guidelines.

A total of four different people assisted as 'strangers' for the procedure throughout the course of the study. In line with the manual, the stranger was at all times a female with whom the infant was not familiar. The strangers were three research assistants with undergraduate training in psychology and one clinical nurse specialist from the perinatal psychiatry clinic at Westmead Hospital. All strangers were trained by the investigator.

Rating

Footage was examined for attachment classification by independent certified coders who were blind to the study group and diagnostic status of each mother. All raters were qualified and had undergone reliability training. Classifications were based primarily on the infants' interactive behaviours toward the mother during episodes five and eight (the two reunion episodes). Infant behaviour during reunion was rated on the following four 7-point scales:

a) Proximity seeking

b) Contact maintaining

c) Avoidance of proximity and contact

d) Resistance to contact and comforting

Classifications were assigned according to the Ainsworth system (Ainsworth et al., 1978), with the addition of the disorganized 'D' category (Main, 1996). Behavioural patterns associated with each style of attachment are outlined in Appendix 16.

Statistical Analysis

Following data collection, analysis of variance (ANOVA) with post-hoc testing was used to examine all baseline variables for between-group differences.

Internal consistency of the Infant Caregiving Assessment Scales (INCAS) was evaluated using Cronbach's alpha coefficient, a statistic which provides an average of all split-half estimates of reliability (Cronbach, 1951).

To assess the dimensionality of the INCAS, the data were submitted to a Principal Components Analysis. Rotation was used to determine the simplest pattern of factor loadings and identify the underlying psychological constructs of the scale. An orthogonal rotation method (Varimax) was used. All factors with eigenvalues of 1 or greater were included in the analysis. Sampling adequacy and factorability were examined using Bartlett's test of Sphericity and the Kaiser-Meyer-Olkin (KMO) test. Within the current sample, distribution was examined for normality in terms of the mean, median, mode and skewness of the Domain and Total INCAS scores. Inter-rater reliability was determined by comparing 27 assessments which had been re-rated by an independent trained rater. Consensus between trained raters was examined with the use of Pearson product-moment correlations (Pearson's r, two-tailed). The test-retest reliability (stability) of the INCAS was evaluated on a subsample of nine mother-infant pairs. Ratings from tests and re-tests were compared for agreement, and test-retest concordance was measured using Pearson's product-moment correlations (Pearson's *r*, two-tailed).

Construct validity of the INCAS was then examined in terms of its convergent and discriminant validity. Pearson's product-moment correlations (Pearsons *r*, two-tailed) were used. Convergence of INCAS Total and Domain scores with Camberwell Assessment of Need for Mothers (CAN-M) and Mind-Mindedness (MM) scores was examined. Divergence of the INCAS from Parenting Stress Index (PSI) scores was also assessed.

Discriminant validity of the INCAS was assessed by contrasting the associations between the INCAS and two different parenting measures. Here, the magnitude of correlation (Pearsons r, two-tailed) between the INCAS and feeding sensitivity (as measured by the NCAST) was compared with that of the relationship between the INCAS and parenting stress (as measured by the PSI).

The discriminant validity of the INCAS was next examined in terms of its ability to measure differing aspects of caregiving capacity with its two Domain scores (Emotional and Instrumental). Sizes of correlations between the INCAS Emotional Domain with the NCAST MM and CAN-M measures were compared with those between the INCAS Instrumental Domain with these measures. Pearsons *r* parameteric tests of correlation (two-tailed) were used.

To assess the criterion validity of the scale, the mean Dimension, Domain and Total INCAS scores of the three diagnostic groups were compared using analysis of covariance (ANCOVA). Here, baseline sociodemographic variables that had varied significantly between groups were examined for significance as covariates and entered into each equation. It was observed that while Caucasian women assumed the role of primary caregiver to their infant from birth, it was traditional among East Asian participants for the infant's grandmother to provide the bulk of postpartum caregiving (Davis, 2001; Matthey, 2002).

Anecdotally, this appeared to impact upon the measurement of maternal caregiving ability. The mothers from East Asian backgrounds appeared less competent (presumably due to less practice) than Caucasian women. Thus, culture (East Asian vs. Caucasian) was examined for significance as a covariate. It was also assumed that there would be a confounding effect of parity upon the caregiving capacity of mothers, again due to a practice effect. Parity (i.e. birth order of the study infant) was therefore also examined for significance as a covariate. The homogeneity of regression-slopes between groups for all significant covariates was examined both with Levene's tests, and then graphically to confirm. Custom ANCOVAS were conducted to explore whether there were significant interactions between 'study group' and each of the significant covariates, with INCAS score as the dependent variable. Independent variables included each of the covariates, study group, and interaction variables (study group * covariate). Scattergrams were generated to ensure that there was a linear relationship between each covariate and dependent variable. To reduce chance of Type I error, the dimension scores under each of the domains were examined together in a multiple analysis of variance (MANOVA). Box's tests of equality of variance-covariance matrices were used here. The ANCOVA's were then followed up with multinomial logistic regressions, where the ability of INCAS Total and Domain scores to predict study (and therefore diagnostic) group membership was analysed.

ANOVAS with post-hoc Bonferroni tests followed by logistic regression analyses were then performed to examine the ability of the INCAS to predict whether dyads were engaged vs. not engaged by child protection services following childbirth. Here, involvement of child protection services was the dependent variable, and INCAS Total, Emotional, and Instrumental scores were examined for significance as predictor variables. In this way, the discriminant validity of the INCAS was also partially examined.

Face validity of the INCAS was evaluated by comparing Total and Domain scores with the impressions of perinatal clinicians (as rated on Visual Analogue Scales; VAS). The degree of correlation between clinician-rated parenting capacity (VAS scores) and INCAS ratings was determined using Pearsons *r* parameteric tests of correlation (two-tailed).

Concurrent validity was measured in terms of the relationship between the INCAS Total and Domain scores with the concurrently administered Nursing Child Assessment Feeding Scales (NCAST) (Barnard, 1978). Pearson's product-moment correlations (Pearsons *r*, two-tailed) were used.

Predictive validity of the INCAS was examined in terms of its relationship to 12 month infant outcomes. Firstly, correlations (Pearsons *r*, two-tailed) between INCAS (Total, Domain and Dimension level) and Bayley Scales of Infant Development (BSID-III) (Bayley, 2006) scores were examined. As there were only 17 mothers included in this part of the analysis, the interpretation of *r* values was based on Cohen's rule, which states that Pearson's *r* values of up to .1 are small, those equal to or greater than .3 are medium, and those equal to or greater than .5 are large (Cohen, 1988). The ability of INCAS Total and Domain scores to predict BSID-III domains was then assessed using multiple linear regression (with step-wise entry of predictor variables). Here the criterion variable was BSID-III (scale scores) and the independent (predictor) variables included INCAS scores, together with confounders (variables significantly related to BSID-III scores).

The second outcome measure used in assessing predictive validity of the INCAS was the Strange Situation Procedure (SSP) (Ainsworth et al., 1978), a measure of mother-infant attachment at one year postpartum. Due to very small numbers in each cell for attachment type (there were 9 possible classifications and 21 cases in the analysis), it was only possible to examine the relationship between INCAS and SSP scores at the level of security vs.

insecurity of attachment. Correlations (Pearsons *r*, two-tailed) between INCAS (Total, Domain and Dimension level) and attachment security were evaluated. The interpretation of *r* values was based on Cohen's rule. The ability of INCAS scores to predict attachment security at one year postpartum was then assessed using logistic regression analyses. Here, attachment security was the dependent variable, and INCAS scores were examined for significance as predictor variables alongside confounders (variables significantly related to SSP scores).

Results

Characteristics of Participants: Intake Phase

Mothers were recruited at any stage from pregnancy to when their infants were 16 weeks old. Mothers in the clinical groups were approached by their mental health clinicians (generally either their treating psychiatrist Mothers were recruited at any stage from pregnancy to when their infants were 16 weeks old. Mothers in the clinical groups were approached by their mental health clinicians (generally either their treating psychiatrist or dedicated mental health care nurse) during visits. Most mothers in the healthy control group were approached during their pregnancies while attending their antenatal appointments. These mothers were approached in the waiting room by research staff, who told them about the study. Figure 17 shows participant flow through the intake phase.

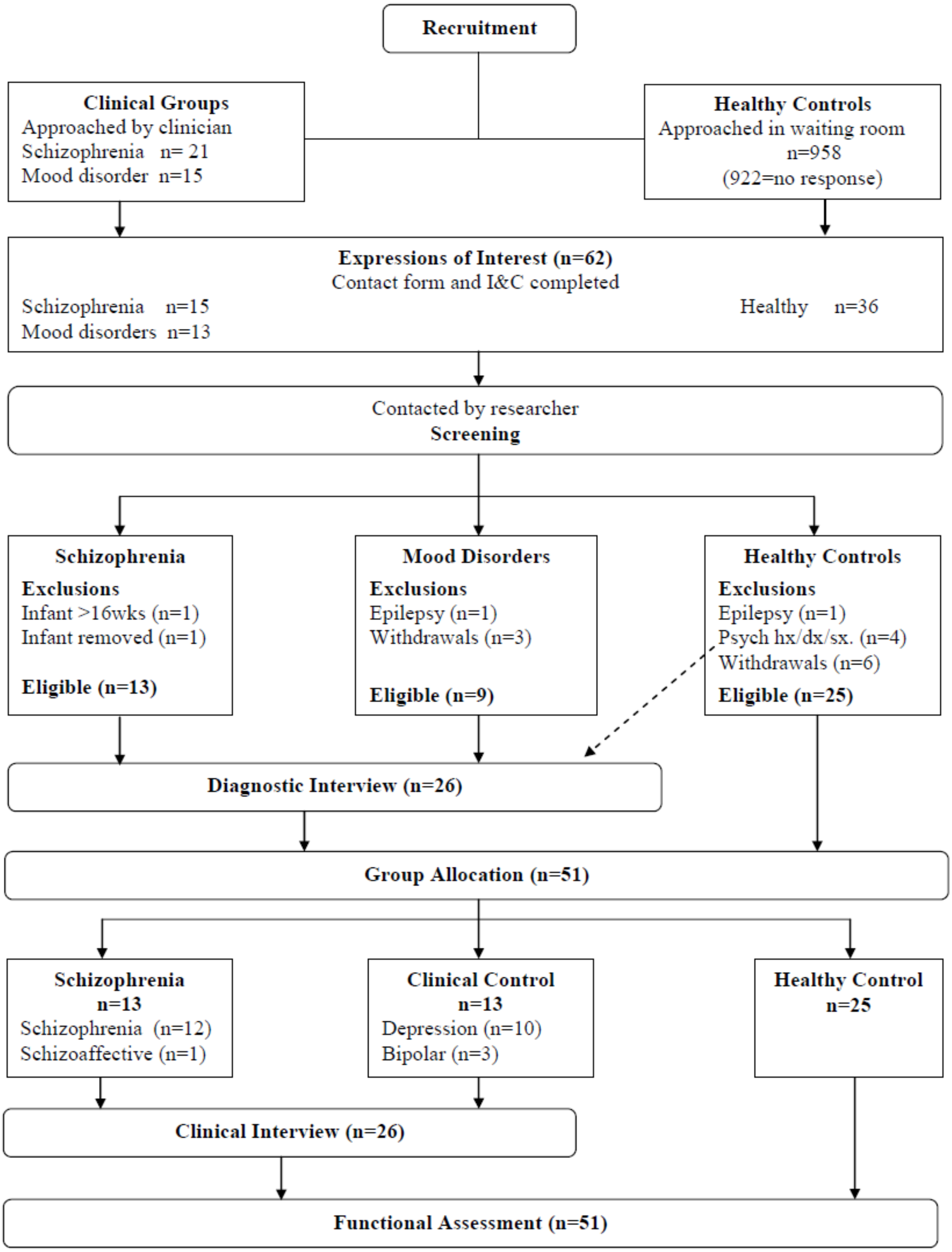


Figure 17. Participant flow through intake phase.

Group 1: Schizophrenia

A total of 21 mothers with schizophrenia was approached to participate in the study. Of these women, six declined. Of the remaining 15 mothers, one was excluded at screening as her infant was over 16 weeks of age. Following screening, one further mother had to be excluded due to child protection concerns which led to the removal of her infant. Following screening, there were 13 mothers in the schizophrenia group (12 with schizophrenia and one with schizoaffective disorder) who took part in the clinical and functional assessment (Table 1). The majority of mothers were in inpatient or residential care settings during baseline assessment (n=8), with most having recently recovered from an acute episode of illness. Positive and Negative Syndrome Scale (PANSS) scores of participants reflected the relative health of mothers in the schizophrenia group at the time of their entry into the study, with subscales scores considerably lower than those observed in both inpatient norms (Peralta & Cuesta, 1994) and the original norms established by (Kay et al., 1987), which came from a mixed in- and out-patient population.

Group 2: Mood Disorders

Fifteen mothers with mood disorders were approached by their clinicians and invited to participate in the study. Fourteen of these mothers agreed to participate. Following screening, one mother was excluded due to a diagnosis of epilepsy, and three mothers withdrew their consent for reasons unspecified. Through the course of clinical and functional assessment, four mothers originally enrolled as healthy controls were reallocated to the clinical control group due to the emergence of clinically significant depressive symptomatology. Final numbers included 13 clinical control group mothers (10 with Major Depressive Disorder and three with Bipolar Disorder). The majority of participants in the mood disorders group were outpatients at the time of baseline assessment (n=10). All mothers with bipolar disorder were in remission at the time of assessment with no frank manic symptoms, while around half of mothers with depression were experiencing mild to moderate depressive symptomatology, as indicated by Depression Anxiety and Stress Scale (DASS) scores (Lovibond & Lovibond, 1995).

Group 3: Healthy Controls

A total of 958 mothers was given fliers and offered contact forms. Two hundred and fifty-three mothers completed contact forms and returned them to the investigator. Thirty six mothers returned signed consent forms in the postage-paid envelopes provided. These mothers were then assessed for eligibility over the phone. Three mothers subsequently withdrew from the study for reasons unspecified, while one mother was excluded due to a diagnosis of epilepsy.

Following baseline assessment, a further four mothers were removed from the healthy control group and reallocated as clinical controls. Despite having reported an absence of psychiatric illness at intake, these mothers showed signs of depression (in the form of clinically significant scores on a self-report measure of depression, together with observed mental status during home visits). Diagnostic assessment confirmed that all four mothers met DSM-IV criteria for Major Depression. Final numbers regarding the diagnostic status of study participants are presented in Table 10.

Table 10. Participant diagnostic status

Diagnosis	N	(%)	Study Group	%
Schizophrenia	12	(23.5)	Schizophrenia n=13	25.5
Schizoaffective disorder	1	(2.0)		
Bipolar disorder	3	(5.9)	Mood Disorders n = 13	25.5
Major Depression	10	(19.6)		
Healthy	25	(49.0)	Healthy Controls n = 25	49
Total	51	(100.0)		100

Final group numbers included 13 index (schizophrenia) mothers, 13 clinical controls, and 25 healthy control group mothers.

Sociodemographic Variables

With the exception of education and income, there were minimal differences between groups on sociodemographic variables (see Table 11). Maternal age ranged from 23 to 44 years (μ = 32 yrs, 10 months; s.d.= 47 months). There were no significant between-group differences in maternal age. While a diagnosis of schizophrenia was associated with the highest rate of single parenting, most mothers tended to have a partner (schizophrenia 85%; clinical and healthy control groups, 100%), and the between-group differences in marital status did not reach significance. Mothers in all groups were most often living in a home that they either fully or partially owned. Renting was the next most frequent home ownership status (23% of schizophrenia and clinical control group mothers; 32% of healthy controls). Two mothers were residing in supported accommodation during the study, both from the schizophrenia group. There were no significant between-group differences in home ownership status (renting vs. mortgage/own outright). Most mothers in the study were Caucasian (77% of schizophrenia and clinical control group mothers; 84% of healthy controls). The other ethnicity was East Asian (23% of schizophrenia and clinical control group mothers; 16% of healthy controls). Just over half of mothers with schizophrenia (54%) had completed school at Year 12 level, compared to 77% and 92% of clinical and healthy control group mothers, respectively.

There was a significant main effect of maternal diagnostic status on rate of Year 12 completion ($F(2, 48) = 4.063$, $p = .023$). Post-hoc testing revealed a significant difference between the healthy control and schizophrenia groups ($p=.019$). There were no other significant between-group differences. While there were no significant between-group differences in the proportion of mothers who had completed tertiary education, the majority of schizophrenia group mothers held Certificate level qualifications, while most tertiary education within the clinical control group was at Diploma level, and at Bachelor level in the Healthy Control group.

A maternal diagnosis of schizophrenia was associated with the lowest rate of Year 12 completion among the partners of mothers in the study ($F(2, 46) = 6.317$, $p = .004$). A post-hoc test revealed a significant difference between the healthy control and schizophrenia groups ($p = .003$). There were no significant between-group differences in the rate of tertiary education in partners, however the bulk of partners of mothers in the schizophrenia group held qualifications at the Certificate or Diploma level, whereas partners of mothers in each of the control groups more often held university-level qualifications. Overall, most partners were in full- or part-time work. Within the schizophrenia group, 69% of partners were in full- or part-time work. Some 85% of partners in the clinical control, and 96% of partners in the healthy control groups were engaged in full- or part-time employment. A psychiatric illness in the mother (and in particular, schizophrenia) was associated with significantly higher rates (schizophrenia 39%; clinical control 15%; healthy control 4%) of government pension as the family's primary source of income ($F(2, 48) = 4.256$, $p = .02$), with post-hoc tests showing a significant difference between the healthy control and schizophrenia groups ($p = .016$), but not between any other of the between-group pairs.

Table 11.Sociodemographic Variables by Study Group

	Schizophrenia (n=13)		Clinical Control (n=13)		Healthy Control (n=25)		Sig. *(p)*
Age (mths)	403.5	(51.9)	395.8	(47.5)	388.4	(45.3)	ns
People in home *median* (range)	4	(2)	4	(3)	4	(3)	ns
Relationship status *n* (%)							
Single	2	(15)	-		-		ns
Partner	11	(85)	13	(100)	25	(100)	ns
Home ownership status *n* (%)							
Own outright	2	(15.4)	1	(7.7)	2	(8.0)	ns
Mortgage	6	(46.2)	9	(69.2)	15	(60.0)	ns
Rent (private)	3	(23.1)	2	(15.4)	8	(32.0)	ns
Rent (govt.)	-		1	(7.7)	-		ns
Residential facility	2	(15.4)	-		-		ns
Born overseas *n* (%)	3	(23.1)	3	(23.1)	8	(32.0)	ns
Ethnicity *n* (%)							
Caucasian	10	(76.9)	10	(76.9)	21	(84.0)	ns
East Asian	3	(23.1)	3	(23.1)	4	(16.0)	ns
Yr 12 *n* (%)	7	(53.8)	10	(76.9)	23	(92.0)	.023
Tertiary ed. *n* (%)	10	(76.9)	11	(84.6)	24	(96.0)	ns
Certificate	4	(30.8)	3	(23.1)	3	(12.0)	
Diploma	1	(7.7)	5	(38.5)	4	(16.0)	
Bachelor degree	2	(15.4)	1	(7.7)	10	(40.0)	
Graduate diploma	1	(7.7)	-		1	(4.0)	
Postgrad. Degree	1	(7.7)	1	(7.7)	6	(24.0)	
Partner comparison							
Yr 12 *n* (%)	4	(30.8)	10	(76.9)	22	(88.0)	.004
Tertiary ed. *n* (%)	7	(53.8)	11	(84.6)	22	(88.0)	ns
Certificate	4	(30.8)	2	(15.4)	4	(16.0)	
Diploma	1	(7.7)	3	(23.1)	5	(20.0)	
Bachelor degree	1	(7.7)	1	(7.7)	7	(28.0)	
Graduate diploma	1	(7.7)	1	(7.7)	3	(12.0)	
Postgrad. Degree	-		4	(30.8)	3	(12.0)	
Partner's Income *n* (%)							
Sickness/DSP	1	(7.7)	1	(7.7)	-		ns
Unemployed	1	(7.7)	-		1	(4.0)	ns
Part-time work	1	(7.7)	-		1	(4.0)	ns
Full-time work	8	(61.5)	11	(84.6)	23	(92.0)	ns
Casual work	-		1	(7.7)	-		ns
On govt. pension *n* (%)	5	(38.5)	2	(15.4)	1	(4.0)	.02

There was a significant main effect of maternal diagnostic status on rate of Year 12 completion ($F(2, 48) = 4.063$, $p = .023$). Post-hoc testing revealed a significant difference between the healthy control and schizophrenia groups ($p=.019$). There were no other significant between-group differences. While there were no significant between-group differences in the proportion of mothers who had completed tertiary education, the majority of schizophrenia group mothers held Certificate level qualifications, while most tertiary education within the clinical control group was at Diploma level, and at Bachelor level in the healthy control group.

A maternal diagnosis of schizophrenia was associated with the lowest rate of Year 12 completion among the partners of mothers in the study ($F(2, 46) = 6.317$, $p = .004$). A post-hoc test revealed a significant difference between the healthy control and schizophrenia groups ($p=.003$). There were no significant between-group differences in the rate of tertiary education in partners, however the bulk of partners of mothers in the schizophrenia group held qualifications at the Certificate or Diploma level, whereas partners of mothers in each of the control groups more often held university-level qualifications. Overall, most partners were in full- or part-time work. Within the schizophrenia group, 69% of partners were in full- or part-time work. Some 85% of partners in the clinical control, and 96% of partners in the healthy control groups were engaged in full- or part-time employment. A psychiatric illness in the mother (and in particular, schizophrenia) was associated with significantly higher rates (schizophrenia 39%; clinical control 15%; healthy control 4%) of government pension as the family's primary source of income ($F(2, 48) = 4.256$, $p=.02$), with post-hoc tests showing a significant difference between the healthy control and schizophrenia groups ($p=.016$), but not between any other of the between-group pairs.

Obstetric and Infant Characteristics

At the time of baseline assessment, all mothers in the study had an infant (biological offspring) in their care. Across the entire sample, the mean infant age at baseline was 13 weeks (s.d.= 6. 8). Obstetric and infant data are summarised in Table 12. This varied somewhat between groups (schizophrenia: μ = 12.5, s.d.= 6.2; clinical control group: μ = 14.6, s.d.= 6.1; healthy control group: μ = 13.8, s.d.= 7.6), although these differences were not significant. Pregnancy had been planned in around half of schizophrenia group mothers (54%), while in clinical and healthy control group mothers, the rate of planned pregnancy was considerably higher (77% and 80%, respectively). There were no significant between-group differences in rate of planned vs. unplanned pregnancy.

Highest rates of gestational diabetes were observed in mothers with Schizophrenia (39%), while high blood pressure was most commonly experienced by mothers with Mood Disorders (31%). As would be anticipated, mothers with psychiatric diagnoses experienced the highest rates of mood disturbance during the antenatal period (39% of schizophrenia group mothers; 54% of clinical controls; 12% of healthy controls). Here the between-group difference in antenatal mood disturbance was significant ($F(2, 47) = 4.58$, p =.02). Post-hoc analysis showed a difference between the healthy and clinical control groups (p =.02). There were no other significant between-group differences. Mean gestational age at birth was 39.3 weeks, with no significant between-group differences.

Maternal mood disorder was associated with a lower birth weight (μ = 3054g, s.d.= 487.4g) than other diagnostic categories ($F(2, 46) = 3.864$, p =.028). However, a post-hoc analysis revealed that the healthy vs. clinical control and schizophrenia vs. clinical control differences were only marginally significant (p = .054 and .055, respectively).

Parity of mothers ranged from one to four children (median = 2; range = 3). There were no significant between-group differences in the rate of primiparity.

Due to the high incidence of psychotic symptomatology during the postpartum period in the schizophrenia group, mothers with schizophrenia were confined in hospital for an average of 12 days following delivery (s.d.= 12.8), whereas mothers in both clinical and healthy control groups were confined for around a quarter of this duration. This between-group difference in length of postpartum hospital stay was significant ($F(2,46)=8.59$, $p=.001$). Post-hoc testing showed this difference to be significant between the schizophrenia group and both the clinical ($p=.002$) and healthy ($p<.001$) control groups.

In association with psychotropic medication usage, having a psychiatric illness was associated with lower rates of breastfeeding (13% in the schizophrenia group; 39% of clinical controls, and 84% of mothers in the healthy control group); ($F(2, 48) = 3.69$, $p = .032$). However post-hoc testing revealed that, aside from a marginally significant difference between the healthy control and schizophrenia groups in rate of breastfeeding ($p = .054$), there were no other significant differences between the groups. In keeping with the study protocol, all infants within the study were observed by their mothers to be in either *'very good'* or *'excellent'* health, with no health conditions, accidents or operations.

Table 12. Obstetric and Infant Variables by Study Group

	Schizophrenia (n=13)		Clinical Control (n=13)		Healthy Control (n=25)		Sig. *(p)*
Planned preg. *n* (%)							
Yes	7	(53.8)	10	(76.9)	20	(80.0)	ns
No	5	(38.5)	3	(23.1)	5	(20.0)	ns
Obstetric issue *n* (%)							
Gestational diabetes	5	(38.5)	1	(7.7)	3	(12.0)	ns
High Blood pressure	1	(7.7)	4	(30.8)	1	(4.0)	ns
Dep/Anx/Stress	5	(38.5)	7	(53.8)	3	(12.0)	.02
Gestational age at birth (wks) *μ* (s.d.)	39.3	(1. 6)	38.5	(1.8)	39.6	(1.3)	ns
Birthweight (g) *μ* (s.d.)	3518	(401)	3054	(487)	3443	(477)	.028
Infant gender: *n* (%)							
Female	7	(53.8)	7	(53.8)	13	(52.0)	ns
Male	6	(46.2)	6	(46.2)	12	(48.0)	ns
Birth order *n* (%)							
1	3	(23.1)	5	(38.5)	13	(52.0)	ns
2	8	(61.5)	5	(38.5)	8	(32.0)	ns
3	2	(15.4)	2	(15.4)	4	(16.0)	ns
4	-		1	(7.7)	-		ns
Hospital stay (days) *μ* (s.d.)	12	(12.8)	4	(1.2)	3	(1.5)	.001
NICU admission *n* (%)	3	(23.1)	2	(15.4)	1	(4.0)	ns
Mode of feeding *n* (%)							
Breast	2	(15.4)	5	(38.5)	21	(84.0)	.032
Bottle	7	(53.8)	6	(46.2)	4	(16.0)	ns
Mixed	4	(30.8)	2	(15.4)	-		ns
Infant age at baseline (wks) *μ* (s.d.)	12.5	(6.2)	14.6	(6.1)	13.8	(7.6)	ns
Infant health *n* (%)							
Poor	-		-		-		ns
Fair	-		-		-		ns
Good	-		-		-		ns
Very good	1	(7.7)	2	(15.4)	3	(12.0)	ns
Excellent	12	(92.3)	11	(84.6)	22	(88.0)	ns

Clinical Variables

Medications

In keeping with the study protocol, no healthy control group mothers were taking or had a history of taking psychotropic medication. In keeping with best practice recommendations regarding teratogens in pregnancy and medication during breastfeeding, all mothers were at the time of the study on the lowest possible dose of required medications, and where possible, some mothers were medication-free. The data therefore do not reflect typical patterns of medication for women with schizophrenia, bipolar or depression. All mothers in the schizophrenia group were taking psychotropic medication (see Table 13). Of these mothers, 6 (46%) were prescribed a First Generation Antipsychotic (FGA), while 7 (54%) were prescribed a Second Generation Antipsychotic (SGA). Medication dose among schizophrenia group mothers was measured using Chlorpromazine Equivalence (Cpz. Eq.). Within the clinical control group, 6 mothers (46%) were taking psychotropic medication at the time of the study. Of these mothers, two (15%) were having a SGA, one (8%) was having anticonvulsant medication as a mood stabiliser, and three (23%) mothers were taking a Serotonin Noradrenaline Reuptake Inhibitor (SNRI). None of the women were taking multiple drugs at the time of the study. Medication side effects of the mothers on psychotropic medication were measured with the Liverpool University Neuroleptic Side Effects Rating Scale (LUNSERS) (Day et al., 1995). Findings are not reported here due to high rates of reported abnormalities and red herring scale scores, which were taken to indicate an unreliable item endorsement style by study participants.

Table 13. Medication Profiles of Clinical Groups

Medication class	Schizophrenia (n=13)		Clinical Control (n=13)	
On psychotropic medication *n*(%)	13	(100.0)	6	(46.2)
Antipsychotic *n*(%)				
FGA	6	(46.2)	-	
SGA	7	(53.8)	2	(15.4)
Cpz Eq.	212.85	(170.59)	-	
Anticonvulsant *n*(%)	-		1	(7.7)
Antidepressant *n*(%)				
SSRI	-		-	
SNRI	-		3	(23.1)
Tricyclic	-		-	
Benzodiazepine *n*(%)	-		-	

FGA = first generation antipsychotics; SGA = second generation antipsychotics; Cpz. Eq. = chlorpromazine equivalent; SSRI = selective serotonin reuptake inhibitor; SNRI = serotonin noradrenalin reuptake inhibitor.

Symptoms

The level of psychotic symptoms was measured in the mothers with schizophrenia using the Positive and Negative Syndrome Scales (PANSS) (Kay et al., 1987). A relatively equal ratio of positive to negative symptomatology was observed within the schizophrenia group (although there was a slightly higher tendency towards stronger negative symptomatology, as evidenced by the symptom differential score (μ = -.77; s.d.= 8.07). The PANSS General Psychopathology Scale was not used in this study. Positive and Negative Syndrome Scale (PANSS) scores of participants reflected the relative wellness of mothers in the schizophrenia group at the time of the study compared to in- and out-patient norms (Kay et al., 1987; Peralta & Cuesta, 1994). Mothers were generally observed to be within the 'mild' range when rated on positive and negative symptoms.

Calgary Depression Scale for Schizophrenia (CDSS) (Addington et al., 1992) scores showed that mothers with schizophrenia exhibited low overall levels of depression. The levels of depression, anxiety and stress reported by mothers with Schizophrenia on the Depression Anxiety and Stress Scales (DASS) fell within the 'normal' (non-clinical) range

(Lovibond & Lovibond, 1995), while the clinical control group exhibited clinically ‘mild’ depression, anxiety and stress subscale scores. Like the schizophrenia group, the healthy control group scored within the ‘normal’ range on all three DASS subscales. There was a significant main effect of study group on Depression scores ($F(2, 46) = 6.261$, $p = .004$). A post-hoc test revealed significant differences between the healthy and clinical control groups ($p=.003$) and also between the schizophrenia and clinical control groups ($p=.048$). There were no other significant between-group differences. A significant main effect of study group was found for Anxiety scores ($F(2, 44) = 4.688$, $p = .014$), identified on post-hoc testing to be due to the significant difference between the healthy and clinical control groups ($p=.011$). There were no other significant between-group differences in Anxiety. The groups also differed significantly on Stress scores ($F(2, 45) = 7.13$, $p = .002$). A post-hoc test revealed significant differences between the healthy and clinical control groups ($p=.002$) and also between the schizophrenia and clinical control groups ($p = .019$). The mothers within the clinical control group with a bipolar depression had very low levels of manic symptomatology. Findings regarding symptom severity are summarised in Table 14.

Table 14. Symptom Severity by Study Group

Symptom Scale μ(s.d.)	Schizophrenia (n=13)		Clinical Control (n=13)		Healthy Control (n=25)		Sig. *(p)*
PANSS							
Positive sx	13.7	(6.9)	-		-		-
Negative sx	14.5	(4.7)	-		-		-
Symptom diff	-.8	(8.1)	-		-		-
CDSS	3.3	(2.4)	-		-		-
DASS							
Depression	3.6	(3. 7)	10.8	(12.4)	2.4	(3.6)	.004
Anxiety	4.3	(5.9)	8.8	(10.1)	2.0	(3.3)	.014
Stress	6.7	(8.3)	17.9	(13.4)	6.0	(7.2)	.002
MRS	-		1.2	(3.6)	-		-

CDSS: Calgary Depression Scale for Schizophrenia; DASS: Depression Anxiety and Stress Scales; MRS: Mania Rating Scale.

Functioning

Maternal role functioning, as measured by the Camberwell Assessment of Need for Mothers (CAN-M) (Howard, 2007), was perceived differently within the schizophrenia group by clinicians in comparison to mothers (especially regarding the level of '*total need'* and *'need for service help'*). For the sake of consistency within the current study, clinician ratings were used for all groups in this analysis. There was a significant main effect of study group on level of overall parenting need ($F(2, 48) = 19.85$, $p<.001$). A post-hoc test revealed significant differences between the healthy control and schizophrenia groups ($p<.001$) and the healthy and clinical control groups ($p<.001$). There was no significant difference between the two clinical groups. On all CAN-M measures, a diagnosis of schizophrenia was associated with the highest level of overall need. Psychiatric diagnosis was associated with an increase in external help. This was provided by family ($F(2, 48) = 12.94$, $p<.001$), with post-hoc testing showing significant differences between the healthy control and schizophrenia groups ($p <.001$) and the healthy and clinical control groups ($p =.008$). There was no significant difference between the two clinical groups. Psychiatric diagnosis led to a difference in the level of help provided by services ($F(2, 48) = 16.51$, $p<.001$). This was related to significant differences between the healthy control and schizophrenia groups ($p <.001$) and the healthy and clinical control groups ($p =.015$). There was no significant difference between the two clinical groups. A diagnosis of schizophrenia was associated with the highest level of external help provided by parenting services. Regarding clinician-rated *need* for the mother to have service involvement, there was a significant main effect of study group ($F(2, 48) = 22.86$, $p<.001$). A post-hoc test revealed significant differences between the healthy control and schizophrenia groups ($p <.001$) and the healthy and clinical control groups ($p<.001$). There was no significant difference between the two clinical groups.

Table 15. Maternal Role Functioning across Study Groups, as Measured by the CAN-M

	Schizophrenia (n=13)		Clinical Control (n=13)		Healthy Control (n=25)		Sig. *(p)*
Total Need μ(s.d.)	9.0	(3.5)	7.3	(4.8)	2.4	(2.2)	<.001
Help provided by family μ(s.d.)	9.0	(4.2)	6.7	(5.7)	2.2	(3.0)	<.001
Help provided by services μ(s.d.)	11.0	(7.7)	6.7	(4.2)	2.0	(2.1)	<.001
Need for service help μ(s.d.)	13.5	(6.4)	9.8	(6.6)	2.8	(2.4)	<.001

Quality of life as reported on the WHOQOL-BREF, was highest in the healthy control group and lowest in the clinical control group mothers (Table 8). The schizophrenia group reported highest quality of life in the Physical and Social Domains. A significant main effect of study group was found in Psychological domain scores ($F(2, 47) = 3.63$, p =.034). Here, post-hoc testing showed that the only significant between-group difference was between the healthy and clinical control groups (p =.011). For Social domain scores, a between-group effect was found ($F(2, 47) = 3.72$, p =.032) due to a significant difference between the clinical control and schizophrenia groups (p =.009), but not between either of the clinical groups in comparison to healthy controls. There was a main effect of study group for the Environment domain ($F(2, 47) = 3.87$), p =.028), with post-hoc testing showing a significant difference between the healthy and clinical control groups (p =.010), but not between either of the control groups with the schizophrenia group.

Table 16. Quality of Life across Study Groups as Measured by WHOQOL-BREF

WHOQOL-BREF Domain score μ(s.d.)	Schizophrenia (n=12)		Clinical control (n=13)		Healthy control (n=25)		Sig. *(p)*
Physical	59.52	(13.73)	48.90	(12.40)	53.86	(9.44)	ns
Psychological	65.63	(11.11)	57.69	(12.13)	67.50	(9.85)	.034
Social	87.50	(11.51)	64.74	(28.29)	77.00	(19.88)	.032
Environment	72.66	(12.72)	67.79	(14.51)	79.63	(11.97)	.028

Interpersonal functioning was measured using the IPRI (Table 9). Here, the clinical control group reported the highest levels of Conflict and the lowest experience of Social

Support, relative to the other two study groups. Schizophrenia group mothers tended to list fewer personal relationships than did clinical or healthy control group mothers. There were significant between-group differences regarding IPRI Conflict scores ($F(2, 39) = 3.35$, $p=.05$) driven by the clinical control group having significantly higher Conflict scores than healthy controls ($p = .048$). There were no other significant between-group differences in this subscale. Between-group differences were also observed in the number of personal relationships listed ($F(2, 38) = 3.15$, $p = .05$). Post-hoc testing showed this difference to be significant between the healthy control and schizophrenia groups only ($p = .05$), with no other significant between-group differences in total number of relationships.

Table 17. Interpersonal Relationship Functioning across Study Groups as Measured by the IPRI

IPRI subscale μ(s.d.)	Schizophrenia (n=12)		Clinical control (n=13)		Healthy control (n=25)		Sig. *(p)*
Social support	55.09	(4.81)	51.91	(9.79)	58.60	(9.00)	ns
Conflict	35.82	(7.78)	43.82	(8.61)	34.60	(11.15)	.05
No. of personal relationships	8.30	(4.62)	12.00	(4.24)	12.75	(4.87)	.05

Development and Validation of the Infant Caregiving Assessment Scales (INCAS)

Participant flow through the validation phase is shown in Figure 18. Thirteen mothers with schizophrenia completed the baseline assessment session. Of these, one mother preferred not to be filmed during the parenting capacity session. In this case, her parenting capacity rating was based on direct observation. All of the 13 mothers in the clinical control group completed the Baseline Assessment session. Similarly, all 25 healthy control group mothers participated in the baseline parenting capacity assessment. One mother from each of the clinical groups was not rated on the Mind-Mindedness measure. Each of these mothers spoke in dialects that could not be understood by the Chinese interpreter. Additionally, other mothers (*n*=15) were not rated using the Nursing Child Assessment Feeding Scale (NCAST-F). It was not always possible to capture a feed on film due to timing of the sessions in relation to the infant's sleep/feed/waking cycle. There were also a number of mothers who preferred not to be filmed whilst feeding their infants.

Ten schizophrenia group mothers were enrolled for longitudinal participation in the study. Of these mothers, four completed and returned the six-month follow-up forms. One mother withdrew as she became concerned that she was being judged in a derogatory way by the content of the questionnaires. Two mothers withdrew for reasons unspecified. Two mothers relapsed, requiring a short hospital stay, and one mother had her infant removed.

Ten clinical control group mothers were enrolled for longitudinal participation in the study. Of these mothers, five completed the six-month follow-up forms. Two enrolled mothers failed to complete and return the forms within the required timeframe for inclusion. Permanent drop-outs occurred due to three mothers withdrawing their participation following baseline assessment, for reasons unspecified.

Twenty healthy control group mothers were enrolled for longitudinal participation. Of these mothers, 16 completed the follow-up forms, while four mothers withdrew from the study. Withdrawals occurred when one family moved interstate and three returned to work.

Six mothers with schizophrenia completed the nine month follow-up forms. In addition to the four mothers from six month follow-up, the two mothers who had relapsed elected to rejoin the study.

Seven clinical control group mothers completed the nine month follow-up forms. In addition to the five mothers from six month follow-up, the two mothers who had not completed the six month forms indicated that they wished to continue on with the study and completed the nine month forms.

Fifteen healthy control group mothers completed the nine month follow-up forms. One mother withdrew her participation as she fell pregnant again at eight months postpartum.

Four mothers with schizophrenia participated in the 12 month follow-up assessment. Drop-outs occurred as another mother had her infant removed by child protective services, and one mother relapsed, requiring a short stay in hospital.

Six clinical control group mothers took part in the 12 month follow-up assessment. Of these mothers, two were unable to complete the developmental assessment due to work commitments. One mother withdrew from the study entirely for reasons unspecified.

Fourteen healthy control group mothers completed the 12 month follow-up assessment. Of these mothers, six were unable to complete the developmental assessment as they had returned to fulltime work. One mother withdrew her participation entirely due to a marriage break-up.

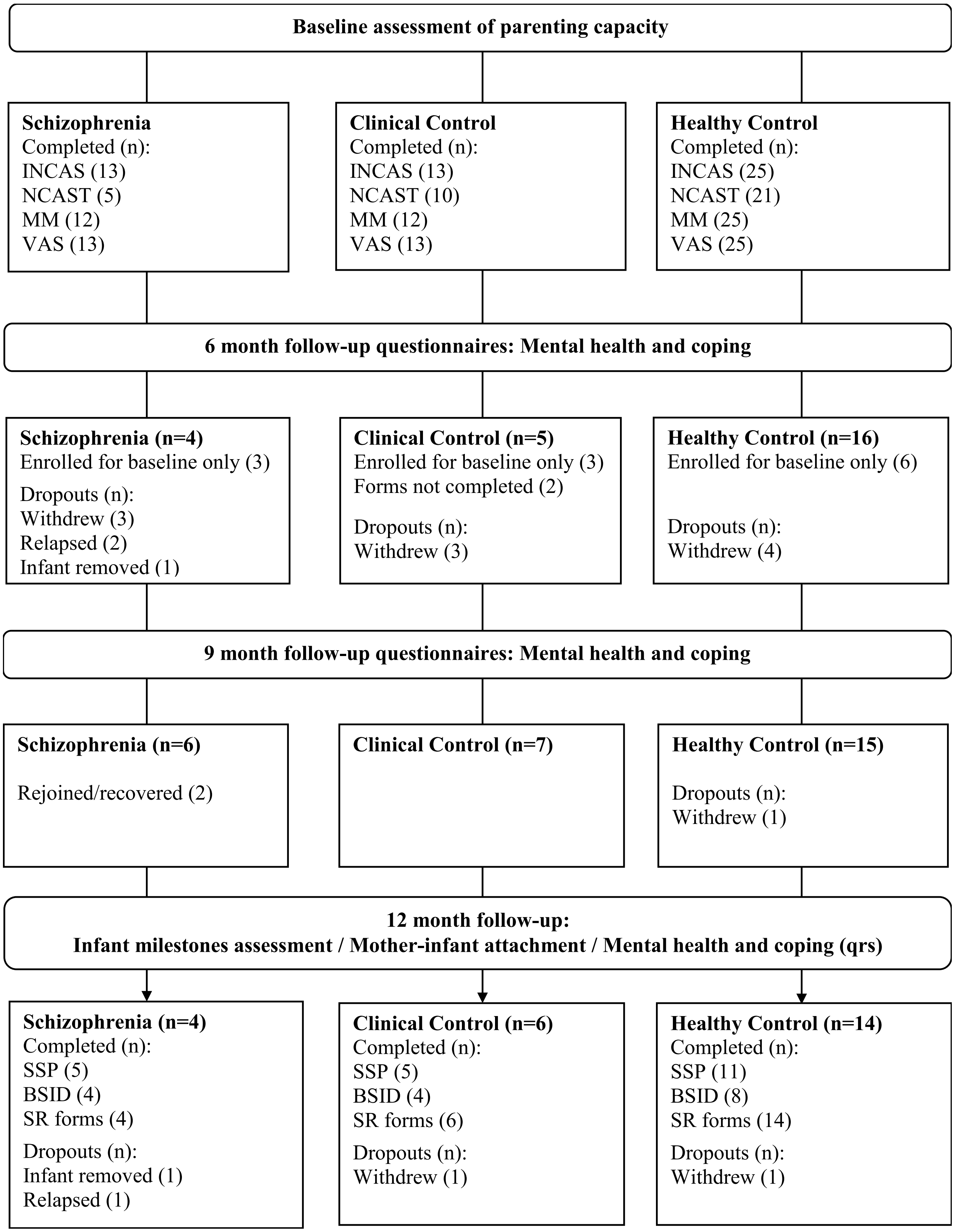


Figure 18. Participant flow through INCAS validation.

Item Selection

Internal consistency of items was examined using Cronbach's alpha coefficient, a statistic which provides an average of all split half estimates of reliability (Cronbach, 1951). Results from the analysis of internal consistency are displayed in Table 18.

Table 18.Cronbach's Alpha Values of INCAS Items after First Round of Analysis

Item	Scale variance if item deleted	Item-Total Correlation	Squared Multiple Correlation (R^2)	Cronbach's Alpha if item deleted
Protection	67.02	.79	.81	.90
Provision	71.47	.65	.68	.90
Diligence	70.61	.60	.73	.90
Competence	69.12	.75	.80	.90
Focus	68.72	.64	.69	.90
Planning	71.84	.40	.64	.91
Holding	71.42	.70	.64	.90
Precision	72.90	.40	.77	.91
Adaptability	67.59	.67	.65	.90
Maternal self-efficacy	72.91	.45	.74	.91
Emotion regulation	67.05	.71	.69	.90
Attributional style	78.58	.00	.47	.92
Affection	66.43	.69	.86	.90
Interaction	65.01	.69	.81	.90
Empathy	66.04	.70	.84	.90
Mindedness	70.54	.67	.60	.90

Cronbach's alpha for the INCAS from the current sample was .91. There were strong indications that *attributional style* was not a consistent part of the scale. There was no part-whole correlation for this item (.00), R^2 was also low (.47), and Cronbach's alpha was increased to .92 when this item was deleted. This item was thus a strong candidate for deletion from the scale. Also exhibiting a higher 'alpha if item deleted' was *planning*. This item, together with *precision* and *maternal self-efficacy* also exhibited markedly lower item-total correlations than other items. These items were left for the following round of the analysis however, as they still held reasonable R^2 values.

The reliability analysis was then repeated on remaining items after *attributional style* had been deleted. Results are displayed in Table 19.

Table 19. Cronbach's Alpha Values of INCAS Items after Second Round of Analysis

Item	Scale variance if item deleted	Item-Total Correlation	Squared Multiple Correlation (R^2)	Cronbach's Alpha if item deleted
Protection	66.56	.80	.81	.91
Provision	70.92	.67	.66	.91
Diligence	70.35	.59	.73	.91
Competence	68.66	.76	.80	.91
Focus	68.36	.64	.69	.91
Planning	71.08	.43	.61	.92
Holding	71.17	.69	.60	.91
Precision	72.41	.41	.77	.92
Adaptability	67.26	.67	.65	.91
Maternal self-efficacy	72.27	.47	.74	.92
Emotion regulation	66.76	.71	.69	.91
Affection	66.41	.67	.82	.91
Interaction	64.64	.69	.80	.91
Empathy	65.83	.69	.81	.91
Mindedness	70.12	.68	.59	.91

With attributional style deleted, Cronbach's alpha for the INCAS from the current sample was .92. The elevated 'alpha if item deleted' score continued to exist for planning. A raised Cronbach's alpha was also indicated for the deletion of precision. As both planning and precision also had lower item-total correlations relative to the other items, the reliability analysis was again repeated with planning and precision deleted. Results can be seen in Table 20.

Table 20. Cronbach's Alpha Values of INCAS Items after Third Round of Analysis

Item	Scale variance if item deleted	Item-Total Correlation	Squared Multiple Correlation (R^2)	Cronbach's Alpha if item deleted
Protection	55.34	.76	.79	.91
Provision	59.29	.61	.65	.92
Diligence	58.79	.54	.65	.92
Competence	57.34	.70	.76	.92
Focus	56.96	.60	.68	.92
Holding	59.36	.65	.59	.92
Adaptability	54.90	.71	.65	.92
Maternal self-efficacy	60.54	.42	.69	.93
Emotion regulation	54.43	.75	.68	.91
Affection	53.48	.75	.80	.91
Interaction	51.98	.76	.79	.91
Empathy	23.22	.75	.82	.91
Mindedness	57.80	.70	.59	.92

With *planning* and *precision* deleted, Cronbach's alpha rose to .92. Within this round of the analysis, *maternal self-efficacy* continued to correlate with the total scale score less strongly than other items. It was also found after this analysis that the internal consistency of the INCAS would increase to .93 if *maternal self-efficacy* was deleted. The final round of analysis was thus completed with *maternal self-efficacy* deleted. Results are shown in Table 21, below.

With *maternal self-efficacy* deleted from the scale, Cronbach's alpha rose to .93. There did not appear to be any further items which were not consistent with the scale.

Table 21. Cronbach's Alpha Values of INCAS Items after Fourth Round of Analysis

Item	Scale variance if item deleted	Item-Total Correlation	Squared Multiple Correlation (R^2)	Cronbach's Alpha if item deleted
Protection	50.71	.74	.78	.92
Provision	54.52	.59	.65	.92
Diligence	53.57	.56	.60	.92
Competence	52.82	.66	.71	.92
Focus	51.96	.60	.68	.92
Holding	54.41	.64	.59	.92
Adaptability	50.21	.70	.63	.92
Emotion regulation	49.72	.75	.67	.92
Affection	48.55	.77	.79	.92
Interaction	47.29	.76	.77	.92
Empathy	48.13	.78	.81	.91
Mindedness	52.73	.72	.57	.92

Dimensionality: Principal Components Analysis

Regarding dimensionality of the INCAS, it was expected that a principal components analysis would reveal the following:

Hypothesis I) All proposed INCAS items would load adequately onto a single Infant Caregiving construct.

Hypothesis II) A two-factor solution would be identified that accounts for an adequate proportion of the variance in infant caregiving capacity between mothers. As suggested by the literature, two separable components of infant caregiving will emerge:

a. Practical caregiving

b. Emotional caregiving.

To assess the dimensionality of the INCAS, the data were analysed by means of a principal component analysis, with varimax rotation. To begin with, a principal components analysis was conducted to ensure that all items loaded adequately onto a single construct. Results are shown in Table 22 below.

Table 22. Principal Component Matrix

	Component 1
Empathy	.812
Protection	.801
Interaction	.800
Affection	.797
Emotion regulation	.791
Mindedness	.766
Adaptability	.747
Competence	.736
Holding	.712
Focus	.680
Provision	.660
Diligence	.636

All items had loadings of .64 or higher. For these items, within the current sample, 55.82% of the variance was explained by the largest scale component.

Following this first analysis, a components analysis which included all factors with eigenvalues of 1 or greater was undertaken to assess the dimensionality of the scale. A two factor solution was found. Here, 55.82% of the variance was explained by component 1 and 13.26% by component 2. A total of 69.08% of the variance was explained by this 2 factor solution. Factor loadings prior to rotation are displayed in Table 23.

Table 23. Unrotated Two-Factor Solution

	Component 1	Component 2
Empathy	.812	-.346
Protection	.801	.348
Interaction	.800	-.395
Affection	.797	-.436
Emotion regulation	.791	-.328
Mindedness	.766	-.119
Adaptability	.747	-.378
Competence	.736	.354
Holding	.712	.293
Focus	.680	.434
Provision	.660	.408
Diligence	.636	.417

Table 24 shows the ordered eigenvalues of each component, with those included falling above the dotted line.

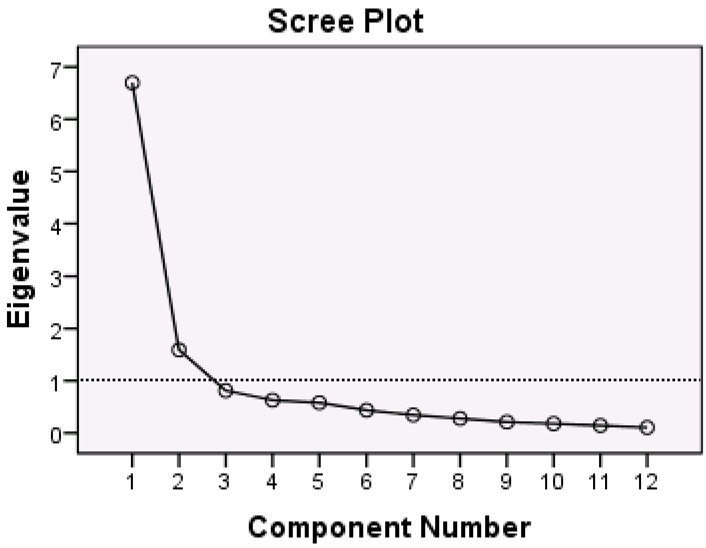


Table 24. Component eigenvalues.

Rotation was used to determine the simplest pattern of factor loadings and identify the underlying psychological constructs being measured. An orthogonal rotation method (varimax) was used (see Table 25).

Table 25. Varimax Rotation (to Make Orthogonal) – Rotation Converged in 3 Iterations

INCAS dimension	Component 1	Component 2
Affection	.881	.221
Interaction	.855	.254
Empathy	.832	.298
Adaptability	.805	.230
Emotion regulation	.803	.297
Mindedness	.643	.433
Protection	.351	.800
Focus	.204	.780
Competence	.299	.760
Provision	.208	.748
Diligence	.184	.738
Holding	.324	.699

KMO and Bartlett's Test of Sphericity

Bartlett's test indicates that the data are factorable (*p*<.001). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is a test of the amount of variance within the data that could be explained by factors, which will form distinct domains within the INCAS. The mean KMO value of .863 indicates that the INCAS has good factorability (see Appendix 17).

An anti-image correlation matrix was then consulted in order to examine the individual KMO values for each of the 12 INCAS items. Here it was found that all INCAS items met criteria for inclusion within the scale (individual item residual values ranged between .78 and .94).

Taken together, the various indicators of factorability were favourable, with the residuals indicating a good solution. Two components with an eigenvalue of greater than 1.0 were identified; the scree plot also indicated two components. The components can be thought of as representing domains of infant caregiving capacity, with Component 1 measuring emotional caregiving capacity and Component 2 measuring instrumental (or practical) caregiving. The domains and the items that load on them are shown in Table 26 below.

Table 26. INCAS Domains.

Emotional caregiving capacity	Instrumental caregiving capacity
Affection	Protection
Interaction	Focus
Empathy	Competence
Adaptability	Provision
Emotion regulation	Diligence
Mindedness	Holding

The final result of components analysis showed that 3 scores can be derived from the INCAS to describe the mother's ability to care for her new infant:

i. Total score
ii. Domain 1 subscale score (Emotional Caregiving)
iii. Domain 2 subscale score (Practical Caregiving).

Group INCAS Scores

The highest scores for INCAS Total, Emotional Domain, and five of the six (excluding *Adaptability*) emotional dimension scores were observed in healthy control group mothers (Table 19). The clinical control group scored higher than the healthy control and schizophrenia group mothers in Instrumental Domain total and five of the six (excluding *Protection*) instrumental dimensions. Schizophrenia group mothers scored the lowest of the three groups on all domains and dimensions of infant caregiving-related functioning. A one-way between-subjects ANOVA showed a significant effect of maternal diagnostic status on Emotional Domain ($F(2,47) = 5.47$, $p = .007$), Instrumental Domain ($F(2,48) = 7.05$, $p = .002$), and Total INCAS scores ($F(2, 47) = 8.07$, $p = .001$). Post-hoc tests revealed that the Emotional Domain scores of schizophrenia group mothers were significantly lower than those of healthy control group mothers ($p = .006$), but not clinical control group mothers.

Regarding Instrumental Domain scores, post-hoc tests revealed significantly lower scores in schizophrenia group mothers than both healthy ($p = .005$) and clinical control ($p = .005$) group mothers. Similarly, schizophrenia group Total INCAS scores were significantly lower than those of healthy ($p = .001$) and clinical control ($p = .007$) group mothers. There were no significant between-group differences regarding Domain or Total INCAS scores between the healthy and clinical control groups. On a dimension level, significant between-group differences on the emotional dimensions of *Affection* ($F(2,48) =$

4.21, p =.021), *Adaptability* ($F(2,48) = 7.13$, p =.002), *Emotion Regulation* ($F(2,48) = 6.67$, p =.003) and *Mindedness* ($F(2,47) = 5.28$, p =.009) were found. Post-hoc tests showed that the *Affection* scores of schizophrenia group mothers were significantly lower than those of healthy (p =.017), but not clinical control group, mothers. On average, the *Adaptability* scores of schizophrenia group mothers were significantly lower than both the healthy (p =.003) and clinical control (p =.009) groups. There was no significant difference between the Control groups regarding *Adaptability* scores. The *Emotion Regulation* scores of schizophrenia group mothers were significantly lower than those of the healthy (p =.003) and clinical control (p =.016) group mothers, however there was not a significant difference on this dimension between the two control groups. The *Mindedness* scores of mothers with Schizophrenia were significantly lower than those in the healthy control group (p =.007), however there were no other significant between-group differences in *Mindedness* scores.

Significant between-group differences between the instrumental dimensions of *Protection* ($F(2,48) = 8.97$, $p<.001$), *Focus* ($F(2,48) = 4.45$, p =.017), *Provision* ($F(2,48) = 7.68$, p =.001) and *Holding* ($F(2,48) = 5.11$, p =.01) were found. A significant difference between the schizophrenia and healthy control groups was found for *Protection* (p =.001), *Focus* (p =.034), *Provision* (p =.009) and *Holding* (p =.015). Similar results were observed in the between-group differences of the schizophrenia and clinical control groups (*Protection* (p =.004), *Focus* (p =.032), *Provision* (p =.002) and *Holding* (p =.027)). The healthy and clinical control groups did not differ significantly on any of the dimensions. No other significant between-group differences were observed.

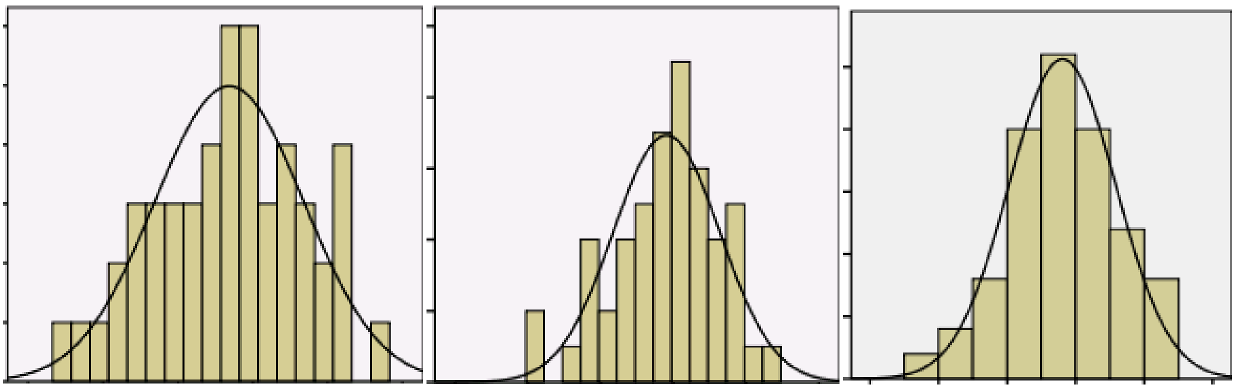
At this stage it is evident that the INCAS is able to distinguish between the varying caregiving skills of some diagnostic categories quite well, with clear differences in the scores of mothers with no psychiatric condition versus the scores of those with schizophrenia disorders. On many dimensions, the tool also seemed able to distinguish between mothers with affective versus psychotic disorders. Regarding affective disorders versus healthy controls, the INCAS was not able to discriminate clearly between groups, although mothers with affective disorders tended to score lower than mothers with no psychiatric illness in all areas of emotional caregiving with the exception of *Adaptability*. Interestingly, mothers with mood disorders tended to score higher than mothers without a diagnosis on most of the instrumental dimensions. This may reflect a localised effect of affective illness upon emotional (versus total) infant caregiving. Schizophrenia on the other hand exerted a deleterious effect upon all aspects of early infant care. Mean differences are displayed graphically in Appendix 18.

Table 27. Mean Postpartum INCAS scores by Study Group

INCAS Dimension Score μ(s.d.)	Schizophrenia (n=13)		Clinical Control (n=13)*		Healthy Control (n=25)		Sig. *(p)*
Affection	1.92	(1.03)	2.60	(.95)	2.87	(.92)	.021
Interaction	1.62	(1.02)	2.07	(1.13)	2.52	(1.09)	ns
Empathy	1.87	(1.12)	2.13	(1.03)	2.45	(.98)	ns
Adaptability	1.15	(.79)	2.19	(.93)	2.17	(.83)	.002
Emotion regulation	1.58	(1.10)	2.54	(.55)	2.58	(.82)	.003
Mindedness	1.75	(.60)	2.33	(.61)	2.46	(.69)	.009
Emotional Domain	**9.88**	**(4.87)**	**13.88**	**(4.68)**	**15.05**	**(4.42)**	**.007**
Protection	1.54	(1.00)	2.54	(.58)	2.57	(.67)	<.001
Focus	1.71	(.92)	2.58	(.70)	2.46	(.84)	.017
Competence	1.92	(.72)	2.63	(.90)	2.43	(.71)	ns
Provision	2.50	(.46)	3.33	(.53)	3.11	(.63)	.001
Diligence	2.75	(.91)	3.06	(.62)	3.00	(.78)	ns
Holding	1.17	(.62)	1.79	(.70)	1.75	(.48)	.01
Instrumental Domain	**11.60**	**(3.72)**	**15.92**	**(2.90)**	**15.32**	**(3.24)**	.002
INCAS Total	**21.48**	**(8.03)**	**30.33**	**(6.13)**	**30.37**	**(6.52)**	**.001**

*N=12 clinical control group mothers for Mindedness, Emotional Domain, and INCAS Total scores.

Emotional Domain | Instrumental Domain | INCAS Total



(a) Distribution of Emotional domain scores | *(b)* Distribution of Instrumental domain scores | *(c)* Distribution of INCAS Total scores

Table 28.Distribution of INCAS scores

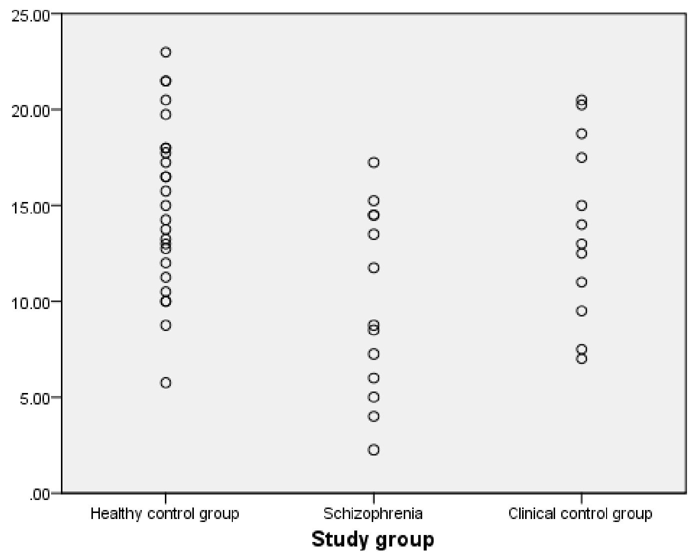
As can be seen in Table 28, INCAS Emotional, Instrumental, and Total scores were normally distributed. The distribution information of each score is summarised in Table 29 below. For each of the Domain and Total scores, the mean and median were within one point of each other. The mode seemed to deviate from the mean to a greater extent than did the median (particularly for the Emotional Domain scores).

Table 29. Distribution of INCAS Scores

	Emotional	Instrumental	INCAS Total
Mean	13.43	14.52	28.05
Median	13.63	15	28
Mode	8.75	13	24
Skewness	-.174	-.422	-.370

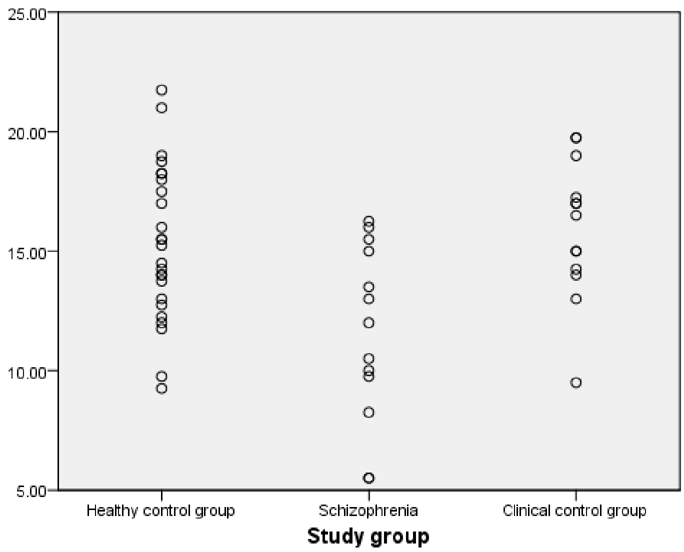
Distribution of study group INCAS Emotional, Instrumental, and Total scores is shown graphically in Table 30. Here it can be seen that the tool captures variability at both the lower and higher ends of the ability spectrum.

Emotional Domain



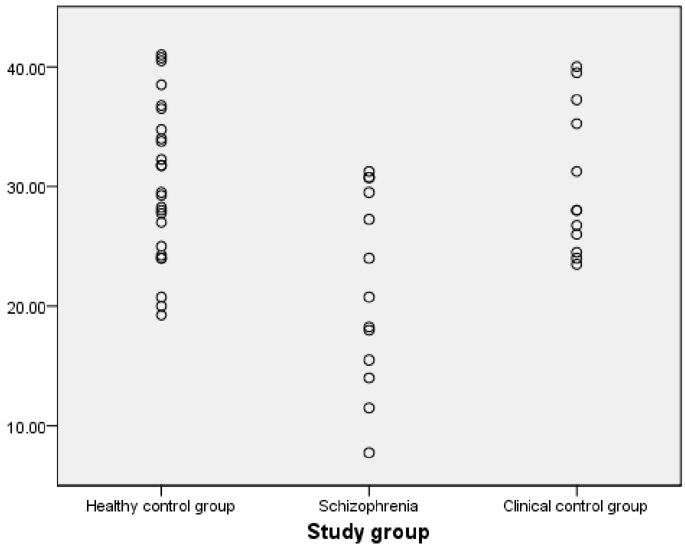
30.a) Distribution of Emotional group domain scores

Instrumental Domain



30.b) Distribution of group Instrumental domain scores

INCAS Total



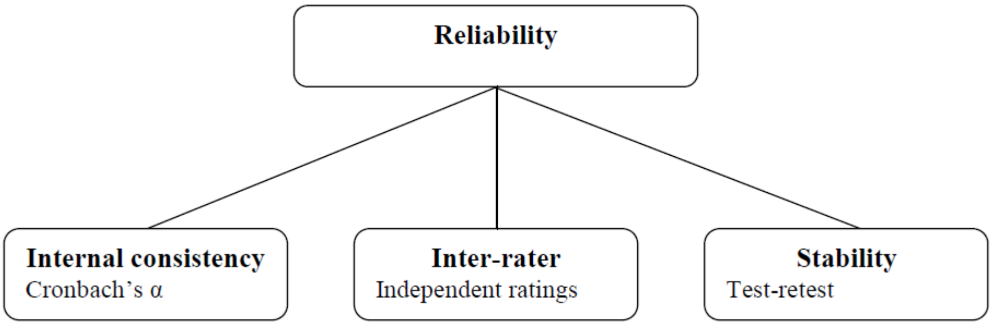
30.c) Distribution of group INCAS Total scores

Table 30. Distribution of group INCAS scores

The final version of the INCAS was next evaluated for reliability and validity. The overarching hypothesis was that *the INCAS will validly and reliably assess the parenting capacity of postpartum mothers with schizophrenia and other serious psychiatric illnesses.*

Findings are presented below.

Psychometric Evaluation of the INCAS: Reliability Analysis



To assess reliability, internal consistency of items was examined using Cronbach's alpha coefficient (Cronbach, 1951). Inter-rater reliability was determined by comparing a sub-sample of 27 assessments which had been re-rated by an independent trained rater. The test-retest reliability (stability) of the INCAS was then evaluated on a subsample of 9 mother-infant pairs from the healthy control group, who were filmed completing the designated caregiving tasks on two separate occasions. Ratings from tests and re-tests were then compared for concordance. Hypotheses pertaining to the reliability analysis were as follows:

Hypothesis III) INCAS Total, Emotional and Instrumental scale scores will each exhibit Cronbach's α values of greater than or equal to .8.

Hypothesis IV) Consensus between two independent raters on a shared sub-sample of INCAS assessments will be shown by high levels of inter-rater agreement.

Hypothesis V) Stability of the INCAS will be demonstrated by strong correlations between ratings taken one week apart on a sub-sample of mothers.

Internal Consistency of the INCAS

Internal consistency of INCAS Total and Domain score items was examined using Cronbach's alpha coefficient (Cronbach, 1951). The internal consistencies of the three scores were all found to be strong (Emotional Domain, α=.93; Instrumental Domain, α=.86; Total Score, α=.92).

Inter-rater Reliability of the INCAS

Inter-rater reliability of the INCAS was determined by comparing 27 assessments which had been re-rated by an independent trained rater. Consensus between trained raters was examined using Pearson product-moment correlations. Very strong agreement was observed between raters on INCAS Total ($r = .92$, $n = 27$, $p <.001$), Emotional ($r =.91$, $n = 27$, $p <.001$) and Instrumental ($r =.92$, $n = 27$, $p <.001$) Domain scores. At the dimension level, emotional dimension reliabilities ranged from .64 to .91, and instrumental dimension reliability coefficients ranged between .72 and .89 (see

Table 31). In all, the tool demonstrated strong inter-rater reliability, particularly with respect to Domain and Total scores. Weaker inter-rater reliability was found for Empathy relative to other dimensions, indicating that this item may require improved (e.g. more specifically detailed) rating criteria due to its greater propensity for subjective interpretation.

Table 31. Inter-rater Reliability of INCAS Dimension, Domain and Total Scores

INCAS item	Reliability coefficient (Pearson's *r*)
Affection	.81**
Interaction	.80**
Empathy	.64**
Adaptability	.73**
Emotion Regulation	.90**
Mindedness	.91**
Emotional Domain	**.91****
Protection	.88**
Focus	.89**
Competence	.76**
Provision	.72**
Diligence	.79**
Holding	.74**
Instrumental Domain	**.92****
INCAS Total	**.92****

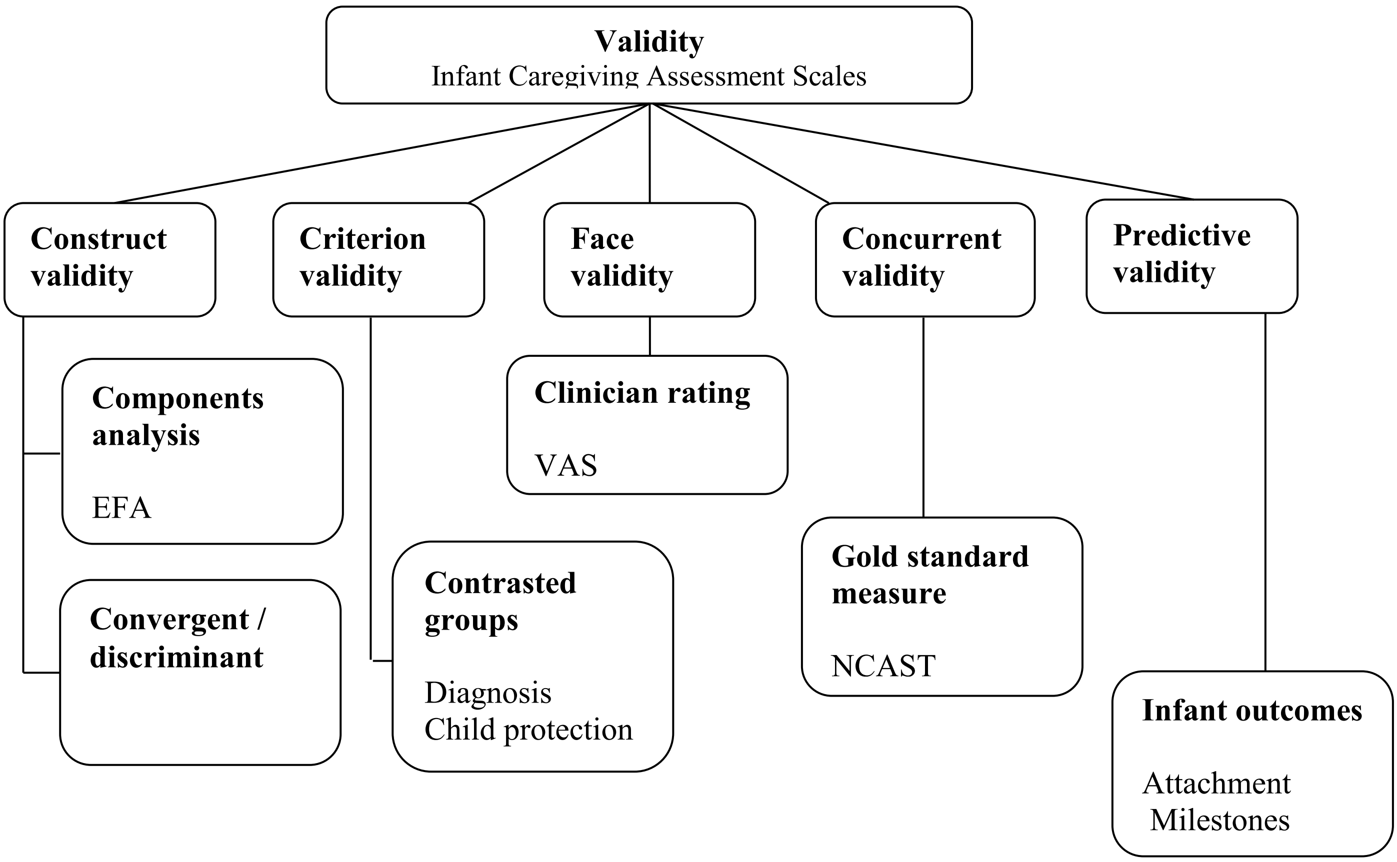
*p<.05; **p<.001

Test-retest reliability

The test-retest reliability (stability) of the INCAS was evaluated on a subsample of mother-infant pairs (n=9) from the healthy control group, who were filmed completing the designated caregiving tasks on two separate occasions. Ratings from tests and re-tests were then compared for agreement. Contrary to initial protocol, re-testing within seven days of the first INCAS assessment was not always possible. The median time lapse between first and second testing session was 9 days (min=1 day; max=64 days). As one of the re-tested mothers spoke in a dialect unrecognised by the Chinese translator, only her Instrumental domain score was calculated and included in the analysis (the Mindedness dimension requires the analysis of spoken dialogue). Test-retest concordance was strong for INCAS Total (r =.96, n = 8, p <.001), Emotional (r =.95, n = 8, p <.001) and Instrumental (r =.93, n = 9, p <.001) Domain scores. This showed that the INCAS is a very robust assessment of infant caregiving capacity, with the ability to demonstrate stability over lapses of up to 64 days in duration.

Taken together, the INCAS has good reliability. Internal consistency of the final 2-factor solution was strong, with high alpha values for Domain and Total scores. Furthermore, the INCAS exhibited adequate inter-rater reliability and robustness in terms of its stability over time between repeat administrations.

Psychometric Evaluation of the INCAS: Validity Study



Construct Validity: Domain and Total Score Correlations

Construct validity of the INCAS was assessed in terms of its convergence with the related constructs of parenting stress, parenting-related need, and maternal mind-mindedness. Regarding parenting stress, it was expected that the INCAS would relate negatively with parenting related stress, such that higher levels of parenting stress as measured by the Parenting Stress Index (PSI)(Abidin, 1995) would be associated with lower levels of Instrumental, Emotional and Total INCAS scores. Regarding parenting-related need, it was expected that mothers with higher levels of need as measured by the Camberwell Assessment of Need for Mothers (CAN-M)(Howard et al., 2007) would exhibit lower INCAS scores. The Mind-Mindedness protocol (MM) (Meins et al., 2002) measures the frequency and accuracy of a mother's infant-directed mental state commentary during interactions. It was expected that the INCAS, and particularly the INCAS Emotional Domain, would converge with the Mind-Mindedness procedure, as both measure the mother's capacity to be emotionally available to her infant. Hypotheses relating to construct validity were as follows:

Hypothesis VI) There will be significant negative correlations between the INCAS and PSI scores.

Hypothesis VII) There will be significant negative correlations between the INCAS and CAN-M scores.

Hypothesis VIII) There will be significant positive correlations between the INCAS and MM scores.

Relationship to the Parenting Stress Index

Self-reported parenting stress across diagnostic study groups is summarised in Table 5.24, with higher PSI scores indicative of greater parenting stress. To correct for multiple between-group comparisons, significance was set at $p \leq .01$. The clinical control group reported the highest stress of the three groups on the Child Domain, Parent Domain, and Total Stress indices of parenting stress. At the sub-domain level, the clinical control group scored highest on all parenting sub-domains, and three of the six Child sub-domains, while the healthy control group experienced more stress than the other groups in relation to the Adaptability and Mood of their infant. The schizophrenia group expressed the highest stress of the three study groups in relation to the self-perceived Acceptability of their infant. The most objective measure of life stress, the Life Stress Domain, quantifies the number of life stressors currently being experienced by each mother. In this respect, mothers with Schizophrenia reported highest mean number of external life stressors at the time of baseline assessment.

Taken together, the data from baseline PSI forms indicate that the clinical control group reported the highest levels of total parenting stress, while mothers with schizophrenia reported the highest incidence of extraneous life stressors. There were no significant between-group differences on any of the PSI Child domains.

Regarding the Parent domains, there was a significant between-group difference in Total Parenting domain scores ($F(2, 46) = 6.76$, $p = .003$). Post-hoc testing showed that this between-group difference was significant for the healthy and clinical control groups only, with clinical controls reporting higher levels of overall parenting-related stress ($p = .002$). Within the PSI Parenting domain, significant between-group differences were found regarding the Competence ($F(2,46) = 5.44$, $p = .008$), Isolation ($F(2,46) = 9.11$, $p < .001$), Health ($F(2,46) = 7.99$, $p = .001$), and Role Restriction ($F(2,46) = 5.23$, $p = .009$) parenting sub-scales. The healthy control group scored significantly lower on the Competence sub-scale than did the schizophrenia ($p = .046$) or clinical control ($p = .019$) groups. The clinical control group reported higher levels of stress in relation to Isolation than the healthy control ($p < .001$) and schizophrenia ($p = .01$) groups. Clinical controls also reported more stress relating to Health concerns than did the healthy control (p =.001) or schizophrenia (p =.008) groups. Clinical controls also reported significantly more stress than the healthy control group regarding Role Restriction (p =.007). There were no other significant between-group differences on any other PSI sub-scores.

Table 32. Mean Baseline Parenting Stress Index Scores across Study Groups

Baseline PSI μ(s.d.)	Schizophrenia (n=12)		Clinical Control (n=11)		Healthy Control (n=16)		Sig. (p)
Infant							
Distractibility/ Hyperactivity	24.5	(6.6)	25.7	(5.4)	24.5	(4.1)	ns
Adaptability	38.0	(5.2)	38.5	(6.2)	39.1	(4.5)	ns
Reinforces Parent	9.4	(2.2)	9.6	(2.6)	8.8	(2.5)	ns
Demandingness	16.2	(4.6)	17.7	(4.2)	17.1	(5.0)	ns
Mood	9.8	(3.6)	9.0	(2.4)	9.9	(2.4)	ns
Acceptability	12.8	(4.7)	11.5	(3.8)	11.8	(3.5)	ns
Child Domain	110.6	(15.9)	112.0	(12.8)	111.2	(10.2)	ns
Parent							
Competence	27.7	(5.1)	30.0	(6.5)	23.3	(8.4)	.008
Isolation	4.5	(1.5)	7.6	(1.8)	4.8	(1.6)	<.001
Attachment	12.4	(3.1)	14.4	(3.6)	12.1	(3.7)	ns
Health	12.1	(2.4)	17.4	(3.7)	12.8	(3.3)	.001
Role restriction	10.8	(2.8)	14.7	(3.9)	10.8	(2.8)	.009
Depression	10.3	(2.3)	12.9	(4.5)	10.5	(2.9)	ns
Spouse	9.5	(3.4)	12.6	(2.3)	10.2	(2.4)	ns
Parent domain	87.3	(14.3)	109.6	(20.4)	84.4	(18.1)	.003
Total							
Total stress	197.9	(27.4)	221.6	(29.1)	195.6	(25.2)	ns
Life stress	3.6	(2.5)	3.1	(1.5)	2.8	(1.9)	ns

For the following analyses, two mothers from the clinical control group and eight mothers from the healthy control group were excluded due to an unreliable response style, known as defensive responding (indicated by a Defensive Responding Index of <25) (Abidin, 1995).

It was anticipated that the scores on the PSI would reflect an inverse relationship with the level of parenting capacity identified by the INCAS. To correct for multiple correlations, significance was set at $p \leq .01$. Pearson product-moment correlation indicates significant negative associations between INCAS Emotional domain scores and the PSI Child sub-domains of Reinforces Parent (*r* = -.45, *n* = 50, *p* =.001) (Table 33).

Table 33.Correlation (r) between INCAS and PSI Scores

	INCAS scores (n=48)		
	Emotional domain	Instrumental domain	INCAS Total Score
Infant			
Distractibility/Hyperactivity	-.32	-.13	-.26
Adaptability	.12	.18	.14
Reinforces Parent	-.45*	-.26	-.40*
Demandingness	-.14	-.23	-.19
Mood	-.14	-.13	-.15
Acceptability	-.32	-.41*	-.38*
Child Domain Score	-.34	-.26	-.34
Parent			
Competence	-.10	-.10	-.10
Isolation	-.09	.06	-.03
Attachment	-.24	-.32	-.29
Health	.02	.10	.05
Role restriction	.00	.14	.06
Depression	-.17	.03	-.10
Spouse	.00	-.04	-.03
Parent domain score	-.10	-.04	-.08
Total			
Parenting Stress Index	-.21	-.14	-.20
Life Stressors	-.13	-.08	-.13

**p*≤ .01 (2-tailed)

There was a significant negative association between INCAS Instrumental domain scores and the PSI Child sub-domain Acceptability (*r* = -.41, *n* = 50, *p* =.003) score.

INCAS Total scores were negatively correlated with the PSI Child sub-domains of Reinforces Parent (*r* = -.40, *n* = 50, *p* =.005), and Acceptability (*r* = -.38, *n* = 50, *p* =.007) scores.

In summary, in line with expectations, the INCAS was related negatively with parenting related stress in new mothers, such that higher levels of stress, particularly relating to the mother's experiences with her infant, were associated with lower levels of instrumental, emotional and overall infant caregiving.

Relationship to the Camberwell Assessment of Need for Mothers

The degree and type of parenting-related need across study groups is shown in Table 5.26. Higher levels of parenting-related need (and thus lower role-related functioning) were depicted by higher CAN-M scores. The item relating to sex life was omitted from the analysis as the questionnaire was administered during the immediate postpartum period. On many items, there were discrepancies found between clinician and mother-rated levels of need. Mothers with schizophrenia reported having less need than clinicians judged them to have in the areas of Looking After the Home, Management of Psychotic and Mood Symptoms, Risk to Child and Others, Caring For and Feeling Close to their Infant, and Access to Benefits. Clinical control group mothers reported less need than was reported by clinicians in the areas of Mood Symptoms, Self-Harm, Violence and Abuse, Feeling Close to their Infant, and Language, Culture and Religion. They reported higher need in the area of Accommodation than clinicians. Healthy control group mothers reported higher need in relation to Looking After the Home and Budgeting than did clinician raters. For the purpose of consistency, clinician ratings were used in the analysis which follows. To adjust for multiple between-group comparisons, significance was set at $p \leq .01$.

Clinician ratings of need indicated that mothers in the schizophrenia group tended to experience the most need, relative to the Control group mothers in the areas of Accommodation, Meal provision, Looking After the Home, Self-Care, Daytime Activities, Physical Health, Psychotic Symptoms, Risk to Child and Others, Violence and Abuse, Looking After, and Feeling Close to, their child, and Budgeting. Clinical control group mothers experienced more need than schizophrenia and healthy control group mothers in the areas of Physical Pregnancy and Birth Related Problems, Sleep, Mood Symptoms, Access to

Information, Self-Harm, Alcohol and Substance Misuse, Social Contact, Intimate Relationships, Literacy and Numeracy, Access to Public Transport, and Language, Culture and Religion.

Using one-way ANOVAS, significant between-group differences were found in the areas of Accommodation ($F(2, 48) = 5.31$, $p = .008$), Looking After the Home ($F(2, 48) = 16.30$, $p < .001$), Daytime Activities ($F(2, 48) = 5.37$, $p = .008$), Psychotic Symptoms ($F(2, 48) = 240.08$, $p < .001$), Mood Symptoms ($F(2, 48) = 11.50$, $p < .001$), Access to Information ($F(2, 48) = 8.05$, $p = .001$), Risk to Child and Others ($F(2, 48) = 5.31$, $p = .008$), Looking After the Child ($F(2, 48) = 12.80$, $p < .001$), and Budgeting ($F(2, 48) = 5.02$, $p = .01$). Post-hoc testing showed that on average, mothers with schizophrenia had a higher level of need than healthy controls regarding Accommodation ($p = .006$), Looking After the Home ($p < .001$), Daytime Activities ($p = .01$), Psychotic Symptoms ($p < .001$), Access to Information ($p = .016$), Risk to Child and Others' Safety ($p = .006$), Looking After the Child ($p < .001$), and Budgeting ($p = .022$). Relative to the clinical control group, the schizophrenia group exhibited higher need in the areas of Looking After the Home ($p < .001$), Daytime Activities ($p = .03$), Psychotic Symptoms ($p < .001$), Access to Information ($p = .002$), Looking After the Child ($p = .003$), and Budgeting ($p = .021$). The clinical control group exhibited a significantly higher level of need than the healthy control group in the areas of Mood Symptoms ($p < .001$) and Access to Information ($p = .002$). There were no other significant paired-group differences in any other areas of parenting-related need.

Table 34. Mean CAN-M Scores across Study Groups

		CAN-M Scores μ(s.d.)						
		Schizophrenia (n=13)		Clinical Control (n =13)		Healthy Control (n =25)		Sig. (*p*)
Accommodation	M	.31	(.48)	.15	(.55)	0	(0)	
	C	.31	(.48)	.08	(.28)	0	(0)	.008
Meals	M	.15	(.38)	.08	(.28)	0	(0)	
	C	.15	(.38)	.08	(.28)	0	(0)	ns
Looking after the home	M	.54	(.52)	.15	(.38)	.08	(.28)	
	C	.77	(.60)	.15	(.38)	.04	(.20)	<.001
Self-care	M	.15	(.38)	0	(0)	0	(0)	
	C	.15	(.38)	0	(0)	0	(0)	ns
Daytime activities	M	.23	(.44)	0	(0)	0	(0)	
	C	.23	(.44)	0	(0)	0	(0)	.008
Physical health	M	.46	(.66)	.38	(.65)	.32	(.48)	
	C	.46	(.66)	.38	(.65)	.32	(.48)	ns
Preg./birth problems	M	.31	(.48)	.62	(.51)	.52	(.51)	
	C	.31	(.48)	.62	(.51)	.52	(.51)	ns
Sleep	M	.31	(.48)	.46	(.78)	.16	(.55)	
	C	.31	(.48)	.46	(.78)	.16	(.55)	ns
Psychotic symptoms	M	.92	(.28)	.08	(.28)	0	(0)	
	C	1.00	(0)	.08	(.28)	0	(0)	<.001
Mood symptoms	M	.54	(.52)	.85	(.69)	.20	(.41)	
	C	.62	(.51)	1.08	(.76)	.20	(.41)	<.001
Access to information	M	.92	(.76)	1.08	(.76)	.24	(.60)	
	C	.92	(.76)	1.08	(.76)	.24	(.60)	.001
Self-harm	M	.15	(.38)	.15	(.56)	.04	(.20)	
	C	.15	(.38)	.31	(.75)	0	(0)	ns
Risk to child and others	M	.15	(.38)	.08	(.28)	0	(0)	
	C	.31	(.48)	.08	(.28)	0	(0)	.008
Alcohol/substance misuse	M	.15	(.56)	.31	(.75)	0	(0)	
	C	.15	(.56)	.31	(.75)	.04	(.20)	ns
Social contact	M	.46	(.78)	.77	(1.01)	.20	(.58)	
	C	.46	(.78)	.77	(1.01)	.20	(.58)	ns
Intimate relationships	M	.08	(.28)	.46	(.88)	.08	(.40)	
	C	.08	(.28)	.46	(.88)	.08	(.40)	ns
Sex life	M	n/a	n/a	n/a	n/a	n/a	n/a	
	C	n/a	n/a	n/a	n/a	n/a	n/a	
Violence/abuse	M	.31	(.63)	0	(0)	0	(0)	
	C	.31	(.63)	.15	(.55)	0	(0)	ns
Looking after child	M	.92	(.49)	.38	(.51)	.16	(.37)	
	C	1.08	(.49)	.38	(.51)	.16	(.37)	<.001
Feeling close to child	M	.08	(.28)	0	(0)	.12	(.44)	

	C	.46	(.88)	.15	(.56)	.12	(.58)	ns
Literacy & numeracy	M	0	(0)	.15	(.56)	0	(0)	
	C	0	(0)	.15	(.56)	0	(0)	ns
Telephone access	M	0	(0)	0	(0)	0	(0)	
	C	0	(0)	0	(0)	0	(0)	ns
Access to public transport	M	0	(0)	.31	(.75)	0	(0)	
	C	0	(0)	.31	(.75)	0	(0)	ns
Budgeting	M	.31	(.48)	0	(0)	.04	(.20)	
	C	.31	(.48)	0	(0)	0	(0)	.010
Access to benefits	M	.23	(.60)	0	(0)	0	(0)	
	C	.31	(.63)	0	(0)	0	(0)	ns
Language, culture & religion	M	.15	(.38)	.15	(.38)	.20	(.41)	
	C	.15	(.38)	.23	(.60)	.20	(.41)	ns

M=Mother-rated; C=Clinician-rated.

As with the Parenting Stress Index, it was anticipated here that parenting-related need (indicated by CAN-M scores) would be negatively associated with parenting competence, as measured by the INCAS. To correct for multiple comparisons, significance was set at $p \leq .01$. Pearson product-moment correlations between INCAS scores and Clinician-rated CAN-M scores indicated significant negative correlations between INCAS Emotional domain scores and the CAN-M domains of Psychotic Symptoms (r = -.42, n = 50, p=.003), Looking After Child (r = -.39, n = 50, p=.005) and Feeling Close to Child (r = -.57, n = 50, p<.001) (Table 35).

Table 35. Correlation (r) between INCAS and Clinician-rated CAN-M Scores

Clinician-rated CAN-M Scores	INCAS scores Emotional Domain (n= 50)	Instrumental Domain (n= 51)	INCAS Total Score (n= 50)
Accommodation	-.11	-.13	-.14
Meals	-.06	-.17	-.12
Looking after the home	-.29	-.39*	-.38*
Self-care	-.15	-.28	-.23
Daytime activities	-.28	-.31	-.33
Physical health	.04	.12	.10
Physical perinatal problems	.22	.26	.28
Sleep	-.17	.09	-.06
Psychotic symptoms	-.42*	-.46*	-.49*
Mood symptoms	-.34	-.21	-.29*
Access to information	-.06	-.18	-.10
Self-harm	-.28	-.20	-.28
Risk to child and others	-.21	-.24	-.26
Alcohol/substance misuse	-.22	-.24	-.26
Social contact	.03	-.08	.01
Intimate relationships	.21	.18	.22
Sex life	n/a	n/a	n/a
Violence/abuse	-.09	-.14	-.13
Looking after child	-.39*	-.39*	-.42*
Feeling close to child	-.57*	-.43*	-.58*
Literacy & numeracy	-.01	.02	-.00
Telephone access[a]	n/a	n/a	n/a
Access to public transport	-.02	-.06	.06
Budgeting	-.21	-.33	-.30
Access to benefits	-.08	-.20	-.15
Language, culture & religion	-.10	-.19	-.11

*$p \leq .01$ (2-tailed). [a]not able to be calculated as all participants scored 0 regarding Telephone access.

Significant negative correlations were found between INCAS Instrumental domain scores and the CAN-M domains of Looking After the Home (r = -.39, n = 51, p=.005), Psychotic Symptoms (r = -.46, n = 51, p=.001), Looking After Child (r = -.39, n = 51, p=.005), and Feeling Close to Child (r = -.43, n = 51, p=.001).

Significant negative correlations were found between INCAS Total scores and the CAN-M domains of Looking After the Home (r = -.38, n = 50, p=.006), Psychotic Symptoms (r = -.49, n = 50, p<.001), Looking After Child (r = -.42, n = 50, p=.002), and Feeling Close to Child (r = -.58, n = 50, p<.001).

Taken together, the results show that the INCAS is able to discriminate between mothers who have varying levels of need with respect to areas of their maternal functioning. Mothers with higher levels of need (demonstrated by higher CAN-M scores) exhibited lower INCAS scores. Furthermore, the more practical CAN-M items correlated more strongly with the INCAS Instrumental Domain, whereas those CAN-M items concerning more emotional aspects of parenting-related functioning correlated most strongly with INCAS Emotional domain scores, which supports the tool's discriminant validity.

Relationship to Maternal Mind-Mindedness

The frequency and accuracy of Infant-Directed Mental State Commentary (as measured by the Mind-Mindedness protocol) (Meins et al., 2002) are displayed in Table 36. Mothers with greater capacity received higher scores on Number and Proportion of Appropriate mental state comments, while a higher Number and Proportion of Inappropriate mental state comments reflected a poorer level of ability. It was expected that the INCAS, and particularly the INCAS Emotional domain, would correlate positively with higher ability on the Mind-Mindedness procedure, as both measure the mother's capacity to be emotionally available to her infant.

Healthy control group mothers uttered around 50% more comments pertaining to the mental state of their infant than either of the clinical study groups. Regarding accuracy of their mental state comments, however, the clinical control group exhibited the greatest proportion of correct mentalisations (87.25%), while the schizophrenia group mothers were the least accurate in their commentary (71.77%). There were no significant between-group differences on any of the Mind-Mindedness indices.

Table 36.Maternal Mind-Mindedness by Study Group

Infant-Directed Mental State Comments μ(s.d.)	Schizophrenia (n=12)		Clinical Control (n =12)		Healthy Control (n =25)		Sig. (p)
Total (N comments)	6.2	(5.4)	6.4	(3.6)	9.3	(6.5)	ns
Appropriate	4. 7	(4.9)	5.7	(3.4)	7.6	(5.2)	ns
Inappropriate	1.5	(1.9)	.8	(1.1)	1.6	(4.9)	ns
Proportion (%)							
Appropriate	71.8	(31.1)	87.3	(21.4)	85.1	(22.4)	ns
Inappropriate	19.9	(22.3)	12.8	(21.4)	14.9	(22.4)	ns

Significant positive correlations (Table 37) were found between INCAS Emotional domain scores and the Proportion (r =.40, n = 49, p=.005) and Number (r =.54, n = 49, p<.001) of Appropriate spoken mentalisations. Emotional domain scores were negatively correlated to a significant degree with Proportion (r = -.52, n = 49, p<.001) and Number (r = -.36, n = 49, p=.012) of Inappropriate spoken mentalisations.

There was a significant positive association between INCAS Instrumental domain scores and Number of Appropriate mental state comments (r =.35, n = 49, p=.013). The Instrumental domain did not correlate significantly with any other MM scores.

Significant positive correlations were found between INCAS Total scores and the Proportion (r =.38, n = 49, p=.007) and Number (r =.52, n = 49, p<.001) of Appropriate spoken mentalisations. INCAS Total scores were negatively correlated to a significant degree with Proportion (r = -.46, n = 49, p=.001) and Number (r = -.30, n = 49, p=.038) of Inappropriate spoken mentalisations.

No significant correlations were found between any of the INCAS scores with Total Number of mental state comments.

Overall, the construct validity of the INCAS is supported by its agreement with a measure of the mothers' emotional availability to and connectedness with her child, the Mind-Mindedness procedure. This relationship was reflected most strongly in the correlations between MM items and the INCAS Emotional Domain and Dimension scores. The number and proportion of appropriate mental state comments positively correlated with the INCAS, while the number and proportion of inappropriate comments negatively correlated with the INCAS. This suggested that the INCAS is able to differentiate between mothers on the basis of how well they are able to understand their infants' mental states.

Table 37.Relationship (r) between the INCAS and Mind-Mindedness Scores

	INCAS scores (n =49) Emotional	Instrumental	Total
Proportion appropriate	.40**	.26	.38**
N appropriate	.54**	.35*	.52**
Proportion inappropriate	-.52**	-.26	-.46**
N inappropriate	-.36*	-.14	-.30*
Total N infant directed MS comments	.23	.21	.24

MS: Mental State; ***p*< .01; **p*< .05 (2-tailed)

Discriminant validity. Discriminant validity of the INCAS was explored at both the Total and Domain score levels. As a whole scale, the tool's discriminant validity was established by comparing its correlation with the PSI (Abidin, 1995) to its correlation with the Nursing Child Assessment Feeding Scale (NCAST-F) (Barnard, 1978).

At level of INCAS Domains, it was expected that the Emotional Domain would correlate more strongly than the Instrumental Domain with both the NCAST-F (Barnard, 1978) and the Mind-Mindedness procedure (MM) (Meins et al., 2002), which measure the emotional component of caregiving. Conversely, it was expected that the Instrumental Domain would correlate more strongly than the Emotional Domain with the items in the CAN-M measuring practical aspects of caregiving capacity. Regarding discriminant validity, the following hypotheses were tested:

Hypothesis IX)The magnitude of the correlation between the INCAS and the NCAST will be greater than that between the INCAS and the PSI.

Hypothesis X) The domains within the INCAS measure distinct aspects of caregiving capacity, namely emotional vs. practical caregiving.

a. The Emotional Domain will relate more strongly than the Instrumental Domain to the NCAST and MM.

b. The more practical CAN-M items will correlate more strongly with the INCAS Instrumental Domain, whereas those CAN-M items concerning emotional aspects of parenting-related function will correlate most strongly with INCAS Emotional Domain scores.

Discriminant Validity of the Whole Scale

The relationship between the INCAS and other measures of parenting-related constructs will vary according to the nature of those instruments. One way that parenting instruments differ is in their *modality*. For example, some measures are *observational*, while others are in pen-and-paper *self-report form*. Parenting instruments can also differ in *what they measure*. For example, some focus on the mother's overt infant-directed behaviours, while others enquire about a mother's inner psychological state. The INCAS is an *observational* measure of maternal infant-directed *behaviours*, and as such it was expected to correlate strongly with the NCAST, which is also an *observational* measure of maternal *behaviour*. The PSI, on the other hand, is a *self-report* measure of the mother's *inner parenting stress*.

As expected, the INCAS was strongly related to the NCAST, and more modestly to the PSI (see Table 5.30). INCAS scores were negatively related to parenting stress and positively related to feeding sensitivity. As such, mothers with higher caregiving capacity reported lower levels of parenting stress, and demonstrated greater sensitivity to their infant whilst feeding. Regarding magnitude of relatedness, the NCAST scales were related to a much stronger degree than the PSI scales, which had much weaker negative associations with the INCAS.

The strongest relationship between the PSI and the INCAS was observed for the PSI Child domain subscale, while the PSI Parent domain did not associate with any INCAS scores to a significant degree.

In contrast, moderate to large correlations were observed between INCAS and NCAST scores. Large correlations were observed between the Parent and Total NCAST scores with INCAS Emotional Domain and Total scores. The NCAST Infant scale correlated moderately with the INCAS Emotional Domain, as did all NCAST scales with the INCAS Instrumental Domain.

Table 38. Associations (r) of INCAS with PSI and NCAST

Measure		INCAS Emotional	Instrumental	Total
PSI				
(n=48)	Child	-.34	-.26	-.34
	Parent	-.10	-.04	-.08
	Total	-.21	-.14	-.20
NCAST				
(n=36)	Infant	.36	.33	.38
	Parent	.53	.35	.50
	Total	.54	.40	.53

Discriminant Validity of the Domains

The discriminant validity of the INCAS was next examined in terms of its ability to measure differing aspects of caregiving with the two Domain scores. Because the Emotional and Instrumental domains measure specific aspects of the more general concept of infant caregiving, it was expected that they would relate differently to other external instruments.

It was expected that the INCAS Emotional Domain would relate more strongly than the Instrumental Domain to measures of sensitivity while feeding (measured by the NCAST) and the ability to mentalise during mother-infant interaction (measured by the MM). As shown in Table 38, the Emotional Domain was related more strongly than the Instrumental Domain to both the NCAST and the MM. While the NCAST Parent and Total scales correlated very strongly with the INCAS Emotional Domain, they related only moderately to the Instrumental Domain. Similarly, there were moderate to strong correlations between the MM and the INCAS Emotional Domain, compared to small to moderate correlations between the MM and the Instrumental Domain. Correlations between the INCAS and CAN-M were displayed earlier in Table 35. Results demonstrate that the Instrumental Domain correlated more strongly than the Emotional Domain with practical CAN-M items including *Meals*, *Looking After the Home*, *Self-Care*, *Budgeting*, and *Accessing Benefits*.

These findings can be taken to indicate that the INCAS Domains measure different aspects of caregiving capacity, namely emotional vs. practical caregiving.

Table 39.Contrasting Associations (r) of INCAS Domains with the NCAST and MM

Measure		INCAS Emotional	Instrumental
NCAST			
(n=36)	Infant	.36	.33
	Parent	.53	.35
	Total	.54	.40
MM			
(n=49)	Proportion appropriate	.40	.26
	N appropriate	.54	.35
	Proportion inappropriate	-.52	-.26
	N inappropriate	-.36	-.14
	Total n MS comments	.23	.21

Criterion validity. The criterion validity of the INCAS was assessed in terms of its capacity to discriminate between groups who are known to differ in their early caregiving capacity. It is widely accepted that schizophrenia is associated with deficits in early caregiving capacity, together with the highest child-removal rates in the period after birth. Additionally, mothers with mood disorders are known to experience some difficulties in their emotional caregiving, relative to mothers without a psychiatric illness. Criterion validity of the INCAS was therefore examined in terms of the tool's ability to: a) categorise participants into diagnostic groups; and b) distinguish between mothers who were engaged vs. not engaged with child protection services. Hypotheses relating to criterion validity of the INCAS were as follows:

Hypothesis XI) There will be a relationship between INCAS scores and study (and therefore diagnostic) group membership.

a. *The schizophrenia group will exhibit lower INCAS scores than both of the control groups.*
b. *The clinical control group will exhibit lower INCAS scores than the healthy control group.*
c. *The INCAS will be able to predict study (and therefore diagnostic) group membership of mothers.*

Hypothesis XII) The INCAS will be able to predict child protection intervention, whereby increased child protection intervention will be indicated by lower INCAS scores.

Criterion Validity 1: Maternal Diagnosis

The criterion validity of the INCAS was firstly examined by contrasting the mean dimension, domain and total INCAS scores of the three diagnostic groups, using ANCOVA. This was then followed up with multinomial logistic regression, where the ability of INCAS scores to predict study (and therefore diagnostic) group membership was analysed.

The first step prior to analysing between-group differences was to identify potential covariates. Due to significant between-group differences at baseline assessment, the following demographic variables were examined for significance as covariates in the relationship between INCAS scores and diagnostic status (schizophrenia; affective disorder; no psychiatric illness):

a. Year 12 completion (completed vs. not completed by the mother).
b. Main source of family income (government benefits vs. personal wages).

Additionally, culture and parity were examined as potentially significant covariates in the relationship between INCAS scores and study group membership (see Methodology). Results are summarised below.

Emotional Domain scores. The results showed that while parity (p = .01) and culture (p =.001) were significant covariates in the relationship between INCAS Emotional domain scores and study group, education (p =.58) and benefits (p =.19) were not significant. They were therefore removed from the model.

The covariates appeared to regress onto the Emotional domain scores of each study group in a uniform fashion, as demonstrated by non-significant interactions between each covariate and the between-subjects factor 'study group'. Results are summarised in Table 40.

Table 40.Interaction between Covariates and Study Group on INCAS Emotional Domain Scores

Interaction pair	df 1	df 2	F	Sig. (p)
Group * Parity	2	41	.27	.77
Group * Culture	2	41	.14	.87

A Levene's Test confirmed that the error variance of INCAS Emotional Domain scores is equal across groups (p =.84). After adjusting for parity and culture, there was a significant effect of the between-subjects factor 'study group' upon INCAS Emotional domain scores, $F(2, 45) = 4.66$, p =.014, partial n^2 =.17. Adjusted mean INCAS Emotional domain scores (displayed in Table 41, below) suggest that the schizophrenia group mothers had lower caregiving capacity with respect to their emotional capacities than the healthy and clinical groups.

Table 41. INCAS Emotional Domain Scores across Study Group with Effects of Parity and Culture Removed

Study Group	Mean	Standard Error	95% Confidence Interval	
Schizophrenia	10.50	1.12	8.23 -	12.76
Clinical Control	13.95	1.17	11.59 -	16.31
Healthy Control	14.70	.81	13.06 -	16.33

A multinomial logistic regression analysis was then performed with study (i.e. diagnostic) group membership as the DV and INCAS Emotional Domain score, culture (East Asian/Caucasian), and parity as predictor variables. A total of 50 cases was analysed and the full model predicted study group membership (i.e. diagnostic status) to a degree that was marginally significant (chi-square = 11.98, df = 6, p =.062). The model accounted for between 21.3% and 24.4% of the variance in maternal diagnostic status, with 84% of healthy mothers, 53.8% of mothers with schizophrenia, and 8.3% of mothers with affective illnesses successfully predicted from Emotional Domain, culture and parity values. Overall, 58% of predictions were accurate. Table 42 gives coefficients and the Wald statistic and associated degrees of freedom and probability values for each of the predictor variables. This shows that only Emotional Domain scores were able to significantly and reliably predict study group membership. The values of the coefficients reveal that a 1-point increase in INCAS Emotional Domain score is associated with a decrease in the odds of schizophrenia vs. healthy control group membership by a factor of .76 (95% CI: .62 - .93). Clinical control vs. healthy control group membership was not able to be predicted by culture, parity or Emotional Domain scores. When the schizophrenia and clinical control groups were categorised, only INCAS Emotional Domain scores were able to significantly and reliably predict study group membership. Here, the values of the coefficients reveal that a 1-point increase in Emotional Domain score is associated with a decrease in the odds of schizophrenia group membership by a factor of .80 (95% CI: .64 – 1.00).

Table 42. Variables in the Equation

Study group comparison		B	S.E.	Wald	df	*p*	Odds (B)	95% CI for Odds (B)
Schizophrenia vs. Healthy Control								
	Culture	-.74	1.04	.50	1	.480	.48	.06 - 3.70
	Parity	-.02	.57	.00	1	.977	.98	.32 - 3.01
	Emotional Domain	-.27	.10	6.86	1	.009**	.76	.62 - .93
Clinical Control vs. Healthy Control								
	Culture	-.41	1.07	.15	1	.703	.67	.08 - 5.40
	Parity	.45	.52	.74	1	.389	1.56	.57 - 4.32
	Emotional Domain	-.05	.09	.27	1	.604	.95	.79 - 1.14
Schizophrenia vs. Clinical Control vs. Schizophrenia								
	Culture	-.33	1.22	.07	1	.788	.72	.07 - 7.90
	Parity	-.46	.61	.57	1	.449	.63	.19 - 2.09
	Emotional Domain	-.22	.11	3.87	1	.049*	.80	.64 - 1.00

$^*p<.05$; $^{**}p<.001$

Instrumental Domain scores. The results showed that while parity (p = .02) and culture (p =.02) were significant covariates in the relationship between INCAS Instrumental Domain scores and study group, education (p =.46) and benefits (p =.17) were not significant. They were therefore removed from the model.

The covariates appeared to regress onto the Instrumental domain scores of each study group in a uniform fashion, as demonstrated by non-significant interactions between each covariate and the between-subjects factor ‘study group’. Results are summarised in Table 43.

Table 43. Interaction between Covariates and Study Group on INCAS Instrumental Domain Scores

Interaction pair	df 1	df 2	F	Sig. (*p*)
Group * Parity	2	42	.01	.99
Group * Culture	2	42	.31	.74

Scattergrams (Figure 19) demonstrated homogeneity of regression for all significant covariates with all relevant INCAS scores. All regression lines were directionally similar, and regression lines between groups were roughly parallel for all covariates.

A Levene's Test confirmed that the error variance of INCAS Instrumental Domain scores was equal across groups (p =.20). After adjusting for parity and culture, there was a significant effect of the between-subjects factor 'study group' upon INCAS Instrumental Domain scores, $F(2, 46) = 6.59$, p =.003, partial n^2 =.22. Adjusted mean INCAS Instrumental Domain scores (displayed in Table 44, below) suggest that the schizophrenia group mothers had lower caregiving capacity with respect to their instrumental abilities compared with the healthy and clinical control groups.

Table 44.INCAS Instrumental Domain Scores across Study Groups with Effects of Parity and Culture Removed

Study Group	Mean	Standard Error	95% Confidence Interval	
Schizophrenia	11.94	.86	10.21 -	13.66
Clinical Control	16.07	.86	14.35 -	17.79
Healthy Control	15.07	.62	13.82 -	16.32

A multinomial logistic regression analysis was then performed with study (i.e. diagnostic) group membership as the DV and INCAS Instrumental Domain score, culture (East Asian/Caucasian), and parity as predictor variables. A total of 51 cases was analysed and the full model was significant (chi-square = 14.52, df = 6, p =.024). The model accounted for between 24.8% and 28.3% of the variance in maternal diagnostic status, with 80% of healthy mothers, 46.2% of mothers with schizophrenia, and 15.4% of mothers with affective illnesses successfully predicted from Instrumental Domain, culture and parity values. Overall, 54.9% of predictions were accurate. Table 45 gives coefficients and the Wald statistic and associated degrees of freedom and probability values for each of the predictor variables. This shows that only Instrumental Domain scores were able to reliably predict study group membership. The values of the coefficients reveal that a 1-point increase in Instrumental Domain score is associated with a decrease in the odds of schizophrenia vs. healthy control group membership by a factor of .72 (95% CI: .56 - .94). Clinical control vs. healthy control group membership was not able to be predicted by culture, parity or Instrumental Domain scores. When the schizophrenia and clinical control groups were categorised, only Instrumental Domain scores were able to significantly and reliably predict study group membership. Here, the values of the coefficients reveals that a 1-point increase in Instrumental Domain score is associated with a decrease in the odds of schizophrenia group membership by a factor of .63 (95% CI: .46 – .87).

Table 45. Variables in the Equation

Study group comparison		B	S.E.	Wald	df	p	Odds (B)	95% CI for Odds (B)
Schizophrenia vs. Healthy Control								
	Culture	-.16	.99	.03	1	.869	.85	.12 - 5.87
	Parity	.22	.57	.15	1	.702	1.24	.41 - 3.81
	Instrumental Domain	-.32	.13	6.09	1	.014*	.72	.56 - .94
Clinical Control vs. Healthy Control								
	Culture	.49	.91	.30	1	.585	1.64	.28 - 9.65
	Parity	.70	.50	1.93	1	.165	2.01	.75 - 5.38
	Instrumental Domain	.14	.13	1.11	1	.293	1.15	.89 - 1.50
Schizophrenia vs. Clinical Control vs. Schizophrenia								
	Culture	-.66	1.15	.32	1	.569	.52	.05 - 4.98
	Parity	-.48	.63	.58	1	.448	.62	.18 - 2.14
	Instrumental Domain	-.46	.17	7.89	1	.005**	.63	.46 - .87

*p<.05; **p<.001 (2-tailed)

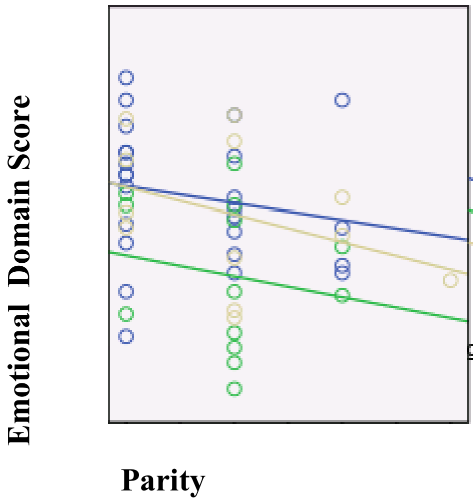
The results showed that while parity (p =.002) and culture (p =.002) were significant covariates in the relationship between INCAS Total scores and study group, education (p =.44) and benefits (p =.09) were not significant. They were therefore removed from the model.

The covariates appeared to regress onto the INCAS Total scores of each study group in a uniform fashion, as demonstrated by non-significant interactions between each covariate and the between-subjects factor 'study group'. Results are summarised in Table 46.

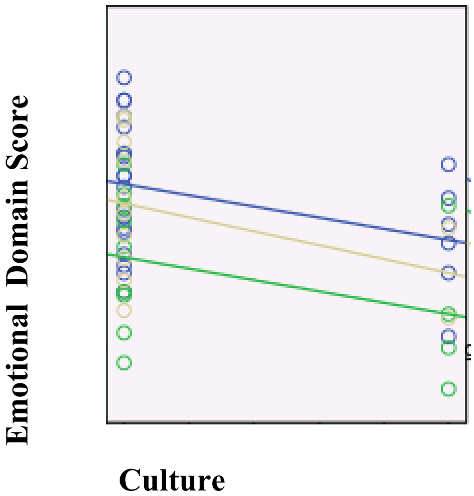
Table 46.Interaction between Covariates and Study Group on INCAS Total Scores

Interaction pair	df 1	df 2	F	Sig. (p)
Group * Parity	2	41	.11	.90
Group * Culture	2	41	.10	.90

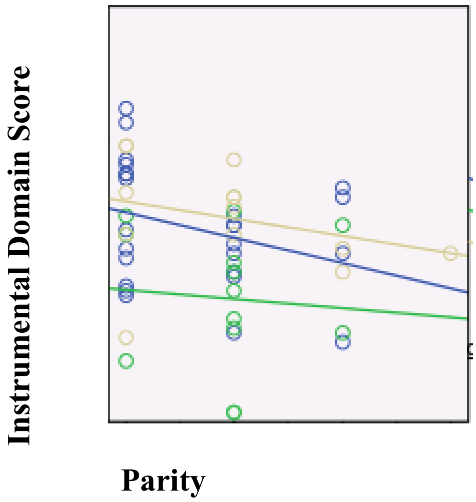
Scattergrams (Figure 19) show that there was homogeneity of regression for all significant covariates with all relevant INCAS scores. All regression lines were directionally similar, and regression lines between groups were roughly parallel for all covariates. Within these Figures, the schizophrenia group is coded in green, clinical controls in brown, and healthy controls in blue.



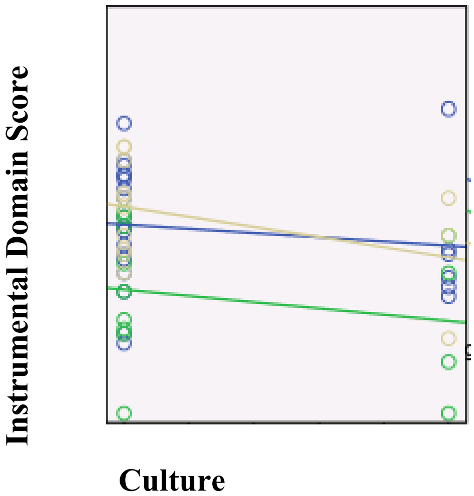
a. INCAS Emotional Domain scores and parity by group



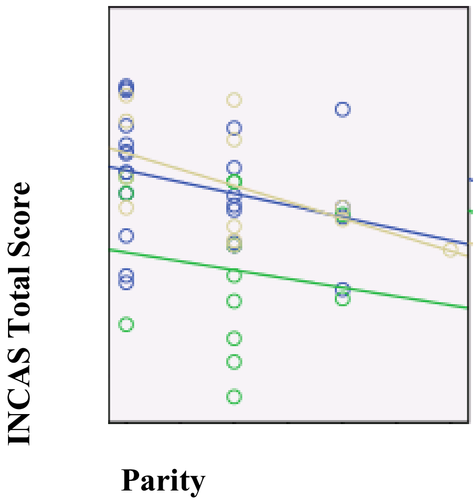
b. INCAS Emotional Domain scores and culture by group



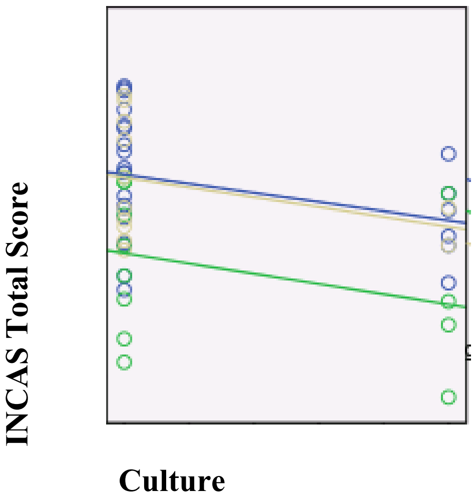
c. INCAS Instrumental Domain scores and parity by group



d. INCAS Instrumental Domain scores and Culture by group



e. INCAS Total scores and parity by group



f. INCAS Total scores and culture by group

Figure 19. *Regressions between covariates with INCAS scores.*

As can be seen, there was an inverse relationship between the infant's birth order and the mother's INCAS Emotional, Instrumental, and Total scores. Regarding culture, Caucasian ethnicity was associated with higher INCAS Emotional, Instrumental, and Total scores than East Asian ethnicity.

The results of the ANCOVA confirmed that the selected covariates were each significantly related to Total INCAS scores. A Levene's test confirmed that the data do not violate the assumption of equality of error variances (p =.13). After adjusting for parity and culture, there was a significant effect of the between-subjects factor 'study group' upon Total INCAS scores, $F(2, 45) = 7.79$, p=.001, partial n^2=.26. Adjusted mean Total INCAS scores (displayed in Table 47) suggest that the schizophrenia group mothers had lower caregiving capacity than the healthy and clinical control groups.

Table 47. Mean INCAS Total Scores across Study Groups with Effects of Parity and Culture Removed

Study Group	Mean	Standard Error	95% Confidence Interval		
Schizophrenia	22.43	1.66	19.09	-	25.78
Clinical Control	30.58	1.73	27.10	-	34.07
Healthy Control	29.76	1.20	27.34	-	32.17

A multinomial logistic regression analysis was then performed with study group as the DV and Total INCAS score, culture (East Asian/Caucasian), and parity as predictor variables. A total of 50 cases was analysed and the full model significantly predicted study group membership (i.e. maternal diagnostic status) (chi-square = 16.54, df = 6, p =.011). The model accounted for between 28.2% and 32.2% of the variance in diagnostic status, with 84% of healthy mothers, 53.8% of mothers with schizophrenia, and 8.3% of mothers with affective illnesses successfully predicted from INCAS Total, culture and parity values. Overall, 58% of predictions were accurate. Table 48 gives coefficients and the Wald statistic and associated degrees of freedom and probability values for each of the predictor variables.

This shows that only INCAS Total scores were able to reliably predict study group membership. The values of the coefficients reveal that a 1-point increase in INCAS Total score is associated with a decrease in the odds of schizophrenia vs. healthy control group membership by a factor of .82 (95% CI: .71 - .94). Clinical control vs. healthy control group membership was not able to be predicted by culture, parity or Incas Total scores. When the schizophrenia and clinical control groups were categorised, only INCAS Total scores were able to significantly and reliably predict study group membership. Here, the values of the coefficients reveal that a 1-point increase in INCAS Total score is associated with a decrease in the odds of schizophrenia group membership by a factor of .79 (95% CI: .67 - .94).

Table 48. Variables in the Equation

Study group comparison		B	S.E.	Wald	df	*p*	Odds (B)	95% CI for Odds (B)
Schizophrenia vs. Healthy Control								
	Culture	-.67	1.05	.41	1	.524	.513	.07 - 3.99
	Parity	-.11	.60	.03	1	.861	.899	.28 - 2.94
	INCAS Total	-.20	.07	7.68	1	.006**	.818	.71 - .94
Clinical Control vs. Healthy Control								
	Culture	.07	1.08	.00	1	.949	1.071	.13 - 8.81
	Parity	.68	.54	1.57	1	.21	1.97	.68 - 5.72
	INCAS Total	.03	.07	.23	1	.63	1.03	.90 - 1.19
Schizophrenia vs. Clinical Control vs. Schizophrenia								
	Culture	-.74	1.28	.33	1	.57	.48	.04 - 5.91
	Parity	-.79	.68	1.34	1	.25	.46	.12 - 1.73
	INCAS Total	-.23	.09	7.12	1	.008**	.79	.67 - .94

**p*<.05; ***p*<.001

To reduce the chance of Type I error, each domain's dimensions were examined together in a multiple analysis of variance. As for Domain and Total scores, it was expected that dimension scores would differ significantly between mothers with schizophrenia in comparison to the two control groups, with the schizophrenia group scoring significantly lower than controls on each dimension.

Emotional dimensions (MANOVAS). *Dependent Variable: INCAS dimension score. Independent Variable: study group. Covariates: parity; culture.* For the overall model, Box's test of equality of variance-covariance matrices was not significant (F(42, 3534.52) = .98, p =.51) indicating that the data were homogenous across groups in their relationship to the covariates.

There was a significant effect of study group (schizophrenia, clinical controls, healthy controls) on the combined dependent variable of all emotional dimension scores (Emotional Domain), $F(12, 80) = 2.50$; Wilks' Lambda =.53; p =.008; partial n^2=.27. Analysis of each individual dependent variable, using a Bonferroni adjusted alpha level of 0.008 (0.05 divided by the number of dependent variables (n = 6)), showed that there was no contribution of the *Affection* $F(2, 45) = 3.12$; p =.054; partial n^2=.12, *Interaction* $F(2, 45) = 2.17$; p =.126; partial n^2=.09, *Empathy* $F(2, 45) = .69$; p =.507; partial n^2=.03 , or *Mindedness* $F(2, 45) = 4.37$; p =.018; partial n^2=.16 dimensions of emotional caregiving. The three groups differed significantly in terms of *Adaptability* $F(2, 45) = 6.33$; p =.004; partial n^2=.22 and *Emotion Regulation* $F(2, 45) = 5.72$; p =.006; partial n^2=.20. It should be noted that for *Mindedness*, a significant Levene's p-value indicated that the covariates did not vary uniformly across the study groups. Results may therefore be less reliable in this case and should be interpreted with caution. Results are summarised in Table 49 below, with mean scores displayed in Table 50.

Table 49. MANOVA Results for Between-Group Differences in INCAS Emotional Dimensions

DV: Dimension	IV: Study group					Covariates		Equality of Variance
	df1	df2	*F*	*p*	Effect size (Partial eta squared)	Culture (*p*)	Parity (*p*)	Levene's (*p*)
Affection	2	45	3.120	.054	.122	.025	.019	.736
Interaction	2	45	2.173	.126	.088	.000*	.004*	.041
Empathy	2	45	.690	.507	.030	.021	.011	.922
Adaptability	2	45	6.328	.004*	.220	.008	.371	.756
Emotion regulation	2	45	5.720	.006*	.203	.004*	.069	.113
Mindedness	2	45	4.374	.018	.163	.004*	.009	.041**

*p<.008; **violates homogeneity of IV x covariate variance.

Table 50. Mean INCAS Emotional Dimension Scores across Study Groups with Effects of Parity and Culture Removed

Dimension	Study Group	*μ*	SE	95% CI	
Affection					
	Schizophrenia	2.03	.25	1.52 -	2.53
	Clinical Control	2.64	.26	2.12 -	3.17
	Healthy Control	2.80	.18	2.43 -	3.17
Interaction					
	Schizophrenia	1.77	.26	1.25 -	2.30
	Clinical Control	2.06	.27	1.51 -	2.60
	Healthy Control	2.43	.19	2.05 -	2.81
Empathy					
	Schizophrenia	1.98	.27	1.44 -	2.52
	Clinical Control	2.19	.28	1.62 -	2.75
	Healthy Control	2.37	.19	1.98 -	2.76
Adaptability					
	Schizophrenia	1.22	.23	.77 -	1.68
	Clinical Control	2.18	.24	1.71 -	2.65
	Healthy Control	2.15	.16	1.82 -	2.48
Emotion Regulation					
	Schizophrenia	1.67	.22	1.23 -	2.11
	Clinical Control	2.54	.23	2.08 -	3.00
	Healthy Control	2.53	.16	2.21 -	2.86
Mindedness					
	Schizophrenia	1.83	.16	1.50 -	2.16
	Clinical Control	2.35	.17	2.01 -	2.69
	Healthy Control	2.41	.12	2.17 -	2.65

Instrumental dimensions. *DependentVariable: INCAS dimension score. Independent Variable: study group. Covariates: parity; culture*. For the overall model, Box's test of equality of variance-covariance matrices was not significant (F(42, 3938.95) = 1.14, p =.25) indicating that the data were homogenous across groups in their relationship to the covariates.

There was a significant effect of study group (schizophrenia, clinical control, healthy control) on the combined dependent variable of all instrumental dimension scores (Instrumental Domain), $F(12, 82) = 2.88$; Wilks' Lambda =.50; p =.002; partial n^2=.30. Analysis of each individual dependent variable, using a Bonferroni adjusted alpha level of .008 (.05 divided by the number of dependent variables (n = 6)), showed that there was no contribution of the *Focus* $F(2, 46) = 3.91$; p =.027; partial n^2=.15, *Competence* $F(2, 46) = 2.73$; p =.076; partial n^2=.11, *Diligence* $F(2, 46) = .56$; p =.57; partial n^2=.02, or *Holding* $F(2, 46) = 4.56$; p =.016; partial n^2=.17 dimensions of instrumental caregiving. The three groups differed significantly in terms of *Protection* $F(2, 46) = 8.72$; p =.001; partial n^2=.28 and *Provision* $F(2, 46) = 7.39$; p =.002; partial n^2=.24. It should be noted that for *Protection*, a significant Levene's p-value indicated that the covariates did not vary uniformly across the study groups. Results may therefore be less reliable in this case and should be interpreted with caution. Results are summarised in Table 51 below, with means displayed in Table 52.

Table 51. MANOVA Results for Between-Group Differences in INCAS Instrumental Dimensions

DV: Dimension	IV: Study group					Covariates		Equality of Variance
	df1	df2	*F*	*p*	eta	Culture (*p*)	Parity (*p*)	Levenes (*p*)
Protection	2	46	8.723	.001*	.275	.001*	.014	.013**
Focus	2	46	3.905	.027	.145	.018	.073	.077
Competence	2	46	2.727	.076	.106	.048	.479	.761
Provision	2	46	7.390	.002*	.243	.019	.047	.635
Diligence	2	46	.561	.574	.024	.952	.012	.427
Holding	2	46	4.563	.016	.166	.744	.078	.163

*p<.008; **violates homogeneity of IV x covariate variance.

Table 52.Mean INCAS Instrumental Dimension Scores across Study Groups with Effects of Parity and Culture Removed

Dimension	Study Group	μ	SE	95% CI	
Protection					
	Schizophrenia	1.63	.19	1.25 -	2.00
	Clinical Control	2.57	.19	2.19 -	2.94
	Healthy Control	2.51	.14	2.24 -	2.78
Focus					
	Schizophrenia	1.79	.22	1.34 -	2.23
	Clinical Control	2.60	.22	1.16 -	3.04
	Healthy Control	2.41	.16	2.09 -	2.73
Competence					
	Schizophrenia	1.97	.21	1.54 -	2.39
	Clinical Control	2.64	.21	2.22 -	3.06
	Healthy Control	2.41	.15	2.10 -	2.71
Provision					
	Schizophrenia	2.55	.15	2.25 -	2.86
	Clinical Control	3.35	.15	3.05 -	3.65
	Healthy Control	3.07	.11	2.86 -	3.29
Diligence					
	Schizophrenia	2.80	.21	2.39 -	3.22
	Clinical Control	3.11	.21	2.70 -	3.52
	Healthy Control	2.95	.15	2.65 -	3.25
Holding					
	Schizophrenia	1.20	.16	.88 -	1.52
	Clinical Control	1.81	.16	1.50 -	2.13
	Healthy Control	1.72	.12	1.49 -	1.95

Taken together, the results showed that the INCAS was able to distinguish mothers with schizophrenia from mothers with affective disorders and no psychiatric illness. INCAS Total, Emotional and Instrumental domain scores were significantly different between study groups, with schizophrenia group mothers scoring lower than both of the control groups on each of the three indices of early parenting capacity. Regarding dimension-level scoring, it was found that Empathy, Adaptability, Protection and Provision were the dimensions that best distinguished between diagnostic categories, with significant between-group differences found for each. While the same pattern of differentiation was found for the remaining dimensions (i.e. with the schizophrenia group scores lower than both control groups), these differences did not reach significance. No significant differences were found between the clinical and healthy control groups.

Criterion Validity 2: Child Protection Intervention

Another important criterion relating to parenting capacity is child protection intervention. This is of particular relevance to the psychiatric population, where the need for child protection intervention is routinely assessed. The tool's clinical utility is connected in part with its ability to indicate a need for child protection, where this exists. Information around clinician-rated need for and involvement of child protection services was therefore collected from participants and examined in relation to parenting capacity, as measured by the INCAS. It was expected that mothers with increasing levels of need for or involvement of child protection intervention would exhibit lower INCAS scores.

The level of child protection intervention by study group is displayed in Table 53 below. Around a quarter of schizophrenia group mothers presented with a prior history of child protection services involvement, while no mothers from the clinical or healthy control groups reported any child protection involvement prior to the study. At the time of intake, three mothers with schizophrenia (23.1%) and two mothers with an affective illness (15.4%) were involved with child protective services.

Table 53. Baseline Child Protection Variables across Study Groups

	Schizophrenia (n=13)		Clinical Control (n=13)		Healthy Control (n=25)
Prior history of involvement with child protection services *n* (%)	3.00	(23.10)	-		-
Current involvement of child protection services *n* (%)	3.00	(23.10)	2.00	(15.40)	-

Mean Total, Emotional and Instrumental INCAS scores (see Table 54) suggest that mothers involved with child protection services had lower caregiving capacity, as measured by the INCAS, than mothers who were not under the notice of child protection services. Results of a one-way ANOVA showed that there was a significant effect of the between-subjects factor 'child protection intervention' upon INCAS Emotional domain scores, $F(1, 48) = 4.23$, p=.05, partial n^2=.08. Results of a one-way ANOVA showed that there was also a significant effect of the between-subjects factor 'child protection intervention' upon Total INCAS scores, $F(1, 48) = 5.24$, p=.03, partial n^2=.10. There was only a marginally significant effect of child protection intervention status upon INCAS Instrumental domain scores ($F(1, 49) = 3.72$, p=.06, partial n^2=.07. In this way, the INCAS and, in particular, Total and Emotional domain scores, seemed able to distinguish between mothers whose parenting capacity was deemed to be adequate vs. inadequate (low risk vs. high risk) by child protective services. Due to small cell sizes, discriminant validity was examined for this variable with regard to INCAS Total scores only.

Table 54. Mean INCAS Scores of Mothers Involved vs. Not Involved with Child Protection Services

	Current involvement of Child Protection services				
INCAS Scores	Yes		No		Sig. (p)
μ(s.d.)		(n=5)		(n=45/46)*	
Emotional	9.20	(6.22)	13.89	(4.70)	.05
Instrumental	11.60	(3.90)	14.84	(3.54)	.06
Total	20.80	(9.68)	28.86	(7.23)	.03

*n=45 for INCAS Total and Emotional; n=46 for Instrumental.

To examine the ability of the INCAS to discriminate between mothers according to their child protection intervention status, a discriminant analysis was performed. Here, 'current involvement of child protection services' (yes/no) was included as the DV, and INCAS Total score was the predictor variable. A total of 50 cases was analysed. Univariate ANOVAS revealed that those involved and not involved with child protection exhibited significantly different Total INCAS scores. A single discriminant function was calculated. The value of this function was significantly different for families involved versus not involved with child protective services (chi square = 4.92, df = 1, p = .027). The correlation between INCAS Total scores and the discriminant function suggested that mothers with higher Total INCAS scores were less likely to be involved with child protection services. Overall the discriminant function successfully predicted outcome for 92% of cases, with accurate predictions being made for 100% of participants not involved with child protection and 20% of the mothers who were involved.

A logistic regression analysis was then performed with child protection intervention as the DV and Total INCAS score, study group, marital status (single/partner), and prior child protection service engagement as predictor variables. A total of 50 cases was analysed and the full model significantly predicted child protection intervention status (omnibus chi-square = 18.89, df = 5, p =.002). The model accounted for between 31.5% and 65.8% of the variance in child protection intervention status, with 100% of non-involved families successfully predicted. However only 40% of predictions for the group of mothers who were involved with child protective services were accurate. Overall, 94% of predictions were accurate. Table 55 gives coefficients and the Wald statistic and associated degrees of freedom and probability values for each of the predictor variables. This shows that none of the predictor variables was able to reliably predict child protection services engagement. It was indicated, nonetheless, that higher INCAS scores are associated with decreased odds of child protection engagement, and that a diagnosed psychiatric illness (membership in either of the clinical study groups), single parent status, and prior history of child protection intervention are all factors which increase the likelihood that child protection services would become involved with the family.

Table 55. Variables in the Equation

Variable	B	S.E.	Wald	df	*p*	Odds (B)	95% CI for Odds (B)
INCAS Total	-.313	.234	1.80	1	.18	.731	.46 - 1.16
Prior engagement with child protection	14.60	40192.97	0	1	1.00	2191330.73	0
Single parent	41.25	46988.78	0	1	1.00	8.19	0
Study group membership							
Other vs. Schizophrenia	-20.06	7107.78	0	1	1.00	0	0
Other vs. Clinical Control	-3.85	2.95	1.70	1	.19	.021	0 - 6.92
Constant	-7.56	40192.97	0	1	1	.001	

Face validity. As there are no other instruments measuring the whole of newborn caregiving (i.e. instrumental and emotional aspects together), the current standard tends to be clinician-estimated competence. Face validity was therefore evaluated by comparing INCAS ratings with the impressions of perinatal clinicians who were naive to the instrument. These clinicians were asked to view the INCAS video footage of 51 study participants and to rate the caregiving capacity of each participant on a Visual Analogue Scale (VAS). VAS ratings were then compared to INCAS scores. It was hypothesised that there would be a significant degree of correlation between clinician-rated parenting capacity (using Visual Analogue Scale scores) and INCAS Total and Domain scale ratings.

Hypothesis XIII) A positive linear relationship between VAS scores (in millimetres) and INCAS Total and domain scores will be observed.

As shown below in Table 56, clinician-rated impressions of overall caregiving competence indicated that schizophrenia group mothers parented significantly less competently than did healthy and clinical control group mothers. Clinicians tended to rate the parenting of mothers in the healthy control group the highest, relative to the other two groups. A one-way between-subjects ANOVA confirmed a significant effect of maternal diagnostic status upon VAS scores ($F(2, 48) = 7.696$, $p = .001$), and post-hoc tests clarified that the VAS scores of schizophrenia group mothers were significantly lower than those of healthy ($p = .001$) and clinical control group mothers ($p = .010$). There was not a significant difference between the VAS scores of the healthy and clinical control groups ($p = .100$).

Table 56. Mean Visual Analogue Scale Caregiving Capacity Scores across Study Groups

	Schizophrenia (n=13)	Clinical Control (n=13)	Healthy Control (n=25)	Sig. (p)
VAS μ(s.d.)	39.73 (15.95)	58.99 (17.1)	60.26 (15.39)	.001

As indicated in Table 57 below, there was a positive linear relationship between VAS scores (in millimetres) and INCAS Total and domain scores. Within these graphs, scores of mothers in the schizophrenia group are shown in green, clinical control in grey, and healthy control in blue. Pearsons r parameteric tests of correlation were therefore used.

The degree of correlation between clinician-rated parenting capacity (VAS scores) and INCAS ratings is summarised in Table 57.

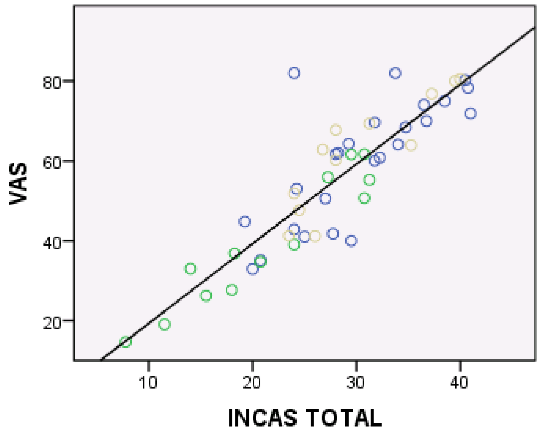
Table 57. Relationship (r) between INCAS and VAS Ratings

	INCAS scores		
	Emotional domain	Instrumental domain	INCAS Total Score
Visual Analogue Scale	.76**	.85**	.88**

**Correlation is significant at the $p < .01$ level (2-tailed).

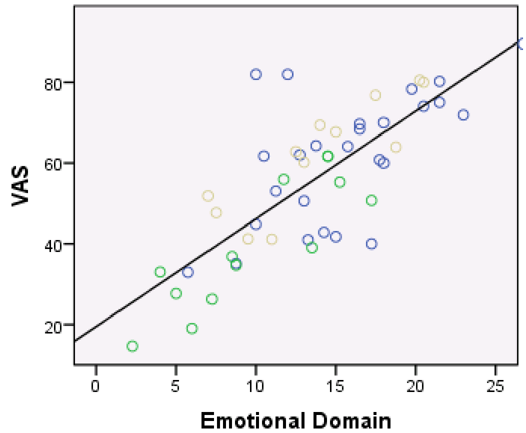
There were significant positive correlations between INCAS Total (r =.88, n = 50, p <.001), Emotional (r =.76, n = 50, p <.001), and Instrumental (r =.85, n = 50, p <.001) Domain scores and VAS ratings. Each of the scattergrams (Figure 20) shows that the data points are reasonably well distributed along the regression line in a linear fashion. These results suggest that the INCAS is able to enumerate the judgement of perinatal clinicians regarding the early caregiving capacity of healthy, mood disordered, and schizophrenia-affected mothers during the postpartum period.

INCAS Total x VAS (r = .88)



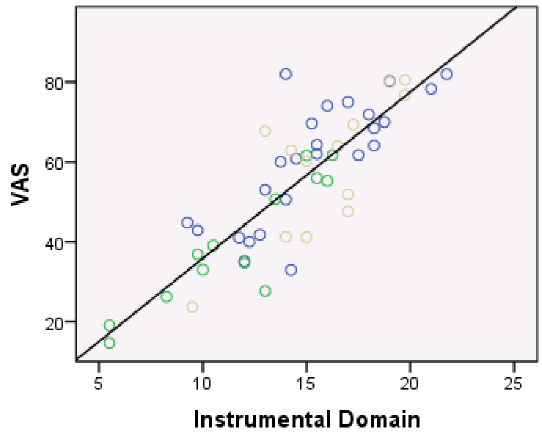
a. Relationship between INCAS Total scores and clinician-rated level of infant caregiving capacity (ie; VAS).

Emotional Domain x VAS (r = .76)



b. Relationship between INCAS Emotional domain scores and clinician-rated level of infant caregiving capacity.

Instrumental Domain x VAS (r = .85)



c. Relationship between INCAS Instrumental Domain scores and clinician-rated level of infant caregiving capacity.

Figure 20. Relationship between INCAS scores and clinician-rated level of infant caregiving capacity (VAS).

The degree of correlation between clinician-rated parenting capacity (VAS scores) and INCAS ratings is summarised in Table 58.

Table 58. Relationship (r) between INCAS and VAS Ratings

	INCAS scores		
	Emotional domain	Instrumental domain	INCAS Total Score
Visual Analogue Scale	.76**	.85**	.88**

**Correlation is significant at the $p < .01$ level (2-tailed).

There were significant positive correlations between INCAS Total ($r = .88$, $n = 50$, $p < .001$), Emotional ($r = .76$, $n = 50$, $p < .001$), and Instrumental ($r = .85$, $n = 50$, $p < .001$) Domain scores and VAS ratings. Each of the scattergrams (Figures 20a-c, above) shows that the data points are reasonably well distributed along the regression line in a linear fashion. These results suggest that the INCAS is able to enumerate the judgement of perinatal clinicians regarding the early caregiving capacity of healthy, mood disordered, and schizophrenia-affected mothers during the postpartum period.

Concurrent validity: Relationship between the INCAS and the NCAST. Infant caregiving capacity in the context of feeding was measured by the Nursing Child Assessment Feeding Scale (NCAST) (Barnard, 1978). The relationship between INCAS and NCAST scores demonstrated the tool's concurrent validity with a gold-standard measure of early caregiving capacity.

Hypothesis XIV) Concurrent validity will be demonstrated by strong agreement between the INCAS and the simultaneously administered NCAST, an established gold-standard measure of infant caregiving.

NCAST-F ratings were based on filmed feeding exchanges, which were scored by an independent trained rater. The NCAST-F is rated from a set of observable behaviours that describe the communication of and interaction between a mother and her infant during a feeding situation. Contingency scores quantified the mother's level of reciprocity on each domain of interaction. For all subscales, higher scores indicated higher maternal ability regarding sensitivity during feeding. Due to the large number of subscales contained within the NCAST, between-group differences have been reported at the level of whole scale scores only (i.e. Caregiver Total, Infant Total, Caregiver/Infant Total) (Table 59). Subscale scores and corresponding between-group differences, together with sub-scale level correlations with the INCAS, can be viewed in Appendix 19.

Table 59. NCAST Feeding Scores across Study Groups

NCAST total scale scores μ(s.d.)	Schizophrenia (n=5)		Clinical Control (n=10)		Healthy Control (n=21)		Sig. (p)
Caregiver	37.2	(5.8)	36.5	(6.3)	43.7	(4. 5)	.002
Infant	15.6	(1.1)	18.3	(4. 5)	20.1	(2.8)	.022
Caregiver/Infant	52.8	(5.8)	54.8	(8.3)	63.8	(6.6)	.001

The healthy control group was rated highest of the study groups on Caregiver, Infant, and Caregiver/Infant Scale Total scores (see Table 59). The lowest ratings were observed in the clinical control group on the Caregiver Total score, while the schizophrenia group scored lowest on the Infant Total and Caregiver/Infant Total scales. This indicates that overall, mothers without a psychiatric illness showed the greatest levels of emotional availability, sensitivity, and cognitive stimulation to their infants whilst feeding as measured on the NCAST. Infants of mothers with schizophrenia were observed to show less clear cues and less responsive behaviour to their mothers than infants of mothers with an affective illness or no psychiatric illness. Mothers with affective illnesses were observed to be less sensitive to their infants' cues and less responsive to their distress than mothers in the schizophrenia or healthy control groups. Mothers with schizophrenia were observed to stimulate their infants' cognitive and emotional development less than the clinical and healthy control groups. Between-group differences are discussed below. Due to very small cell sizes (e.g. only 5 mothers from the schizophrenia group were observed completing a feed), statistical results need to be interpreted with caution. Future studies with larger sample sizes are required for a more reliable statistical analysis.

Overall, there was a significant main effect of study group membership regarding Caregiver Total ($F(2, 33) = 7.86$, $p = .002$), Infant Total ($F(2, 33) = 4.28$, $p = .022$), and Caregiver/Infant Total scores ($F(2, 33) = 8.40$, $p = .001$). Post-hoc tests showed that the Caregiver total scores of healthy control group mothers were significantly higher than those of clinical control group mothers ($p = .003$), and higher than those of schizophrenia group mothers to a marginal degree ($p = .052$).

For Infant Total scores, the scores of healthy control group mothers in comparison to schizophrenia group mothers were significantly higher ($p = .025$), but no other significant between-group differences were found for this subscale. The healthy control group also scored significantly higher than both the clinical control ($p = .006$) and schizophrenia group mothers ($p = .011$) with respect to their Caregiver/Infant Total scores. The difference between the two clinical groups was not significant.

It was anticipated that the scores on the NCAST would have a positive correlation with the level of parenting capacity identified by the INCAS. Significant positive correlations were found between INCAS Emotional Domain scores and the Caregiver Total Domain scores ($r = .53$, $n = 36$, $p = .001$), the Infant Total Domain scores ($r = .36$, $n = 36$, $p = .032$), and the Caregiver/Infant Total scores ($r = .54$, $n = 36$, $p = .001$).

Significant positive correlations were found between INCAS Instrumental Domain scores and the Caregiver Total Domain ($r = .35$, $n = 36$, $p = .034$), the Infant Total Domain scores (*r* =.33, *n* = 36, *p* =.050), and the NCAST Caregiver/Infant Total scores (*r* =.40, *n* = 36, *p* =.017).

Significant positive correlations were found between INCAS Total scores and the Caregiver Total Domain scores (*r* =.50, *n* = 36, *p* =.002), the Infant Total Domain scores (*r* =.38, *n* = 36, *p* =.022) and the Caregiver/Infant Total scores (*r* =.53, *n* = 36, *p* =.001. Correlations are displayed in Table 60.

Table 60. Correlation (r) between INCAS and NCAST Scores

NCAST total scale scores	INCAS Scores (n =36) Emotional	Instrumental	Total
Caregiver	.53**	.35*	.50**
Infant	.36*	.33*	.38*
Caregiver/Infant	.54**	.40*	.53**

***p*< .01; **p*< .05 (2-tailed)

Taken together, the results demonstrated that the INCAS related strongly to the NCAST-F, a measure of early caregiving that has been validated extensively within the literature and used in the clinical setting for over 35 years.

Predictive validity

Predictive validity was tested in terms of the ability of baseline INCAS scores to predict one-year infant outcomes. Important outcomes of early caregiving include the establishment of an infant-caregiver attachment relationship, together with the emergence of the infant's developmental milestones. It was expected that as a measure of postnatal emotional and instrumental caregiving capacity, the INCAS would demonstrate a modest ability to predict mother-infant attachment security (indexed by the Strange Situation Procedure; SSP) (Ainsworth, 1985; Ainsworth et al., 1978) and infant milestones (as indexed by the Bayley Scales of Infant Development; BSID-III) (Bayley, 2006) at 12 months postpartum.

Hypothesis XV) *Baseline INCAS scores will predict BSID-III domain scores at one year postpartum.*

Hypothesis XVI) *Baseline INCAS scores will predict mother-infant attachment security (as measured by the SSP) at one year postpartum.*

It should be noted here that there is considerable doubt as to the veracity of these results due to such small numbers at 12 month follow-up, however, they are reported due to the difficulty in obtaining longitudinal follow-up data, and because they are important in assessing the predictive validity of the INCAS.

Bayley Scales of Infant Development. The cognitive and physical development of infants as measured by the BSID-III at follow-up is recorded in Table 5.52. Infants between 52 and 59 weeks of age were included in the analysis. There were no significant between-group differences in infant age.

The infants of healthy and clinical control group mothers exhibited similar Cognitive scores, while schizophrenia group infants scored lower in this area. Infants of clinical control group mothers were the most advanced in their Communication and Motor Skills development, relative to the other study groups. Schizophrenia group infants scored the lowest of the three groups on Receptive Communication, but scored equal to the healthy control group in their Expressive Communication. The infants of mothers with schizophrenia also exhibited the lowest Fine Motor skills overall, while healthy control group infants were the weakest in relation to Gross Motor development. Analysis of between-group differences was not viable due to such small cell sizes (i.e. there were only four mothers in each of the clinical groups). Nonetheless, a three-way between-subjects ANOVA was completed and can be viewed in Appendix 20.

Table 61. Infant Developmental Milestones across Study Groups at 12 Month Follow-Up

Twelve BSID-III domain score μ(s.d.)	Schizophrenia (n=4)		Clinical Control (n=4)		Healthy Control (n=8)	
Cognition	13.50	(1.29)	15.25	(0.50)	15.50	(1.69)
Communication						
Receptive	9.25	(0.50)	12.25	(2.06)	11.88	(1.13)
Expressive	13.50	(0.58)	14.25	(0.50)	13.50	(1.07)
Motor						
Fine	12.75	(3.10)	16.25	(1.26)	15.75	(2.12)
Gross	15.75	(1.50)	16.25	(1.50)	14.75	(1.75)

The relationship between baseline INCAS and 12 month BSID-III scores can be seen in

Table 62 and Table 63 below. Due to the small number of participants completing 12 month follow-up, correlations which were seemingly substantial in size did not qualify as significant here.

Moderate correlations were observed for all domains of infant development with INCAS Emotional Domain scores, with the exception of the Motor domain scores. The BSID-III Cognition, Receptive and Expressive Communication scores of the infants related strongly with the baseline INCAS Emotional Domain scores. Strong and statistically significant correlations were observed between Instrumental Domain scores and Cognition ($r = .55$, $n = 16$, $p =.028$) and Receptive Communication ($r = .64$, $n = 16$, $p =.008$) BSID-III scores. INCAS Total scores correlated significantly with infant development in the domains of Cognition ($r = .57$, $n = 16$, $p =.022$) and Receptive Communication ($r = .54$, $n = 16$, $p =.031$).

Table 62. Relationship (r) Between Baseline INCAS scores and 12 months BSID-III scores

	INCAS Scores (n=16)		
	Emotional	Instrumental	INCAS Total
BSID Scales			
Cognition	.48	.55*	.58*
Receptive Communication	.38	.64**	.54*
Expressive Communication	.45	.07	.33
Fine Motor	.28	.24	.29
Gross Motor	-.07	-.25	-.16

***p*< .01; **p*< .05 (2-tailed)

The relationship between BSID-III scores and the INCAS was next examined at the level of dimensions. Baseline INCAS Affection scores correlated to a moderate degree with 12 month BSID-III Cognition scores. INCAS Interaction scores correlated strongly with BSID-III Expressive Communication. INCAS Adaptability correlated strongly and significantly with BSID-III Cognition (r =.56, n =16, p =.024) and Expressive Communication (r =.64, n =16, p =.008) scores. Strong correlations were also seen between INCAS Mindedness and BSID-III Cognition (r =.56, n =16, p =.026) Receptive Communication (r =.70, n =16, p =.003), and Expressive Communication (r =.51, n =16, p =.046) scores. Regarding INCAS Protection scores, large correlations were observed with BSID-III Cognition (r =.54, n =16, p =.029) and Receptive Communication (r =.59, n =16, p =.016) scores. INCAS Focus scores correlated to a large degree with BSID-III Cognition (r =.58, n =16, p =.020) and Receptive Communication (r =.58, n =16, p =.018) scores, and to a moderate degree with BSID-III Fine Motor development. Moderate correlations were observed between INCAS Competence and BSID-III Cognition and Receptive Communication scores. INCAS Provision scores correlated strongly and significantly with BSID-III Receptive Communication scores (r =.51, n =16, p =.044), as did INCAS Diligence scores (r =.52, n =16, p =.041). INCAS Holding scores correlated strongly with BSID-III Cognition scores (r =.54, n =16, p =.030) and moderately with Receptive Communication scores. Results are tabulated below.

Table 63. Relationship (r) between Baseline INCAS Dimension Scores and 12 Month BSID-III Scores

	BSID-III Scale Scores (n=16)				
		Communication		Motor	
INCAS	Cognition	Receptive	Expressive	Fine	Gross
Affection	.35	.22	.27	.14	-.14
Interaction	.45	.31	.46	.19	-.14
Empathy	.28	.21	.26	.12	-.12
Adaptability	.56*	.32	.64**	.29	.08
Emotion regulation	.40	.36	.30	.34	-.13
Mindedness	.56*	.70**	.51*	.44	.13
Protection	.54*	.59*	.12	.37	-.34
Focus	.58*	.58*	.21	.41	-.18
Competence	.41	.47*	.05	.09	-.24
Provision	.27	.51*	.12	.17	-.21
Diligence	.31	.52*	-.22	.03	-.19
Holding	.54*	.45	-.05	-.03	-.00

Overall, it was found that the baseline INCAS correlated strongly with aspects of infant development, as measured by the BSID-III at one year. At the INCAS Domain and Total score level, strongest correlations were observed between Instrumental Domain and Total scores with BSID-III Cognition and Receptive Communication scores. Regarding Expressive Communication, the INCAS Emotional Domain correlated most strongly, relative to the Instrumental and INCAS Total scores. While INCAS Total and Domain scores correlated moderately with 12 month Fine Motor development, there was no relationship between any of the INCAS scores and Gross Motor development. INCAS dimensions tended to correlate the strongest and most frequently with BSID-III Receptive Communication scores, and virtually not at all with Gross Motor scores. Regarding INCAS Emotional dimensions, Adaptability and Mindedness were related strongly to BSID-III Cognition. Early Mindedness was linked to the infant's Receptive Communication at one year, while early Interaction and Adaptability seemed most strongly related to the infant's emerging Expressive Communication. Regarding Instrumental dimensions, the infant's Receptive Communication seemed most strongly linked to these scores. There were also large correlations between INCAS Protection, Focus and Holding scores with BSID-III Cognition scores.

Multiple Linear Regression was then used to further examine the link between the INCAS and infant development. Here, potentially confounding variables were held constant to enable a more accurate picture of the relationship. For each BSID-III domain, a regression analysis was performed with INCAS Total and Domain scores entered as independent (predictor) variables, and the relevant BSID-III scale score as the criterion variable. Also entered into the model each time were potentially confounding variables, which included age of infant at follow-up (wks), maternal study group (i.e. diagnostic category: healthy/affective illness/schizophrenia), culture (East Asian/Caucasian), parity, infant gender, and socioeconomic status (indexed by source of income: benefits/wages). Because there are seven independent variables here (where N=17), these results should be treated with caution: there are too few subjects for reliable conclusions to be drawn. Future work is needed with larger numbers in order to revise these analyses.

At the INCAS Domain and Total score level, a significant model was produced when BSID-III Receptive Communication was entered as the Criterion variable. Using the stepwise method, a significant model emerged: $F(1, 14) = 9.44$, p=.008. The model explains 36% of the variance (adjusted R^2=.36). Table 64 gives information for INCAS Instrumental Domain score, which was the predictor variable retained in the model. All other variables were insignificant and therefore excluded from the model. Models with other BSID-III domains entered as the criterion variable were not significant.

Table 64. Regression Coefficients for Baseline INCAS Instrumental Domain Scores

Variable	**B**	**SE B**	**β**
INCAS Instrumental	.29	.09	0.64

Due to small participant numbers, dimension-level regressions have not been not displayed here. They were, however, completed and can be observed in Appendix 20. At the

Domain and Total score level, it appears that high quality practical care in the postpartum period (as measured by the INCAS Instrumental Domain) predicts better receptive communication in the infant at one year of age (indexed by BSID-III Receptive Communication scores).

The Strange Situation Procedure. The establishment of an infant-caregiver attachment relationship is another important outcome of early caregiving. It was expected that, as a measure of early emotional and instrumental caregiving capacity, the INCAS would demonstrate a modest ability to predict mother-infant attachment classification (indexed by the Strange Situation Procedure; SSP) (Ainsworth, 1985; Ainsworth et al., 1978) at one year postpartum. Infants who were 52 weeks of age and older at 12 month follow-up were assessed for mother-infant attachment with the Strange Situation Procedure. Infants included in the analysis were between 52 and 69 weeks of age. For the infants included in this analysis, there were no significant between-group differences in age.

Table 65. Average Infant Age at 12 Month SSP Follow-Up by Study Group

	Schizophrenia (n=6)		Clinical Control (n=6)		Healthy Control (n=10)		Sig. (p)
Infant age (wks) μ(s.d.)	58.0	(3.6)	59.5	(6.7)	54.8	(3.0)	ns

Mother-infant attachment security is summarised by study group in Table 66. There was a higher rate of secure mother-infant attachment in the healthy Control group relative to the clinical groups. Highest rates of attachment disorganisation were observed in the schizophrenia group while, in the clinical control group, most insecure attachments were classed as Ambivalent. Due to very small cell sizes (and the fact that some cells contained zero participants), between-group differences in rates of attachment were not analysed in this instance.

Table 66. Strange Situation Procedure Mother-Infant Attachment Classification by Study Group

		Schizophrenia (n=5)	Clinical Control (n=5)	Healthy Control (n=11)
Security n (%)				
	Secure	2 (40%)	3 (60%)	8 (73%)
	Insecure	3 (60%)	2 (40%)	3 (27%)
Insecure sub-class n (%)				
	Avoidant	0 (0%)	0 (0%)	1 (9%)
	Ambivalent	1 (20%)	2 (40%)	0 (0%)
	Disorganised	2 (40%)	0 (0%)	2 (%18)

Correlations between postnatal INCAS scores and attachment security at one year postpartum are displayed in Table 66. INCAS Total (r=.51, n =21, p =.019) and Instrumental Domain (r=.50, n =21, p =.021) scores correlated strongly with attachment security at one year postpartum, while a medium sized correlation was seen between Emotional Domain scores and security. Within the emotional dimensions, there was a large correlation between Mindedness and security (r=.62, n =21, p =.003) and medium correlations between security and Affection (r=.44, n =21, p =.044), Interaction, and Emotion Regulation. Regarding instrumental dimensions, there was a large correlation between security and Diligence (r=.54, n =21, p =.012), and medium correlations between security and Protection, Focus, Competence, Provision and Holding. Overall, it could be seen that while emotional aspects of early caregiving were most certainly important in the early stages of the attachment relationship, there were aspects of instrumental care that related more strongly to the attachment relationship at one year. When considering dimensions individually, the strongest relationships overall were observed between attachment security and early maternal Mindedness and Diligence.

Table 67.Relationship (r) between the INCAS and Attachment Security at One Year

INCAS		Attachment Security (n=21)
Total	Total	**.51***
Domains	Emotional	.41
	Instrumental	**.50***
Dimensions	Affection	**.44***
	Interaction	.36
	Empathy	.19
	Adaptability	.14
	Emotion Regulation	.34
	Mindedness	**.62****
	Protection	.39
	Focus	.37
	Competence	.41
	Provision	.43
	Diligence	**.54***
	Holding	.40

**$p < .01$; *$p < .05$ (2-tailed)

Due to low N in each cell for attachment type (there were 9 possible classifications and 21 cases in the analysis), it was only possible to examine the relationship with attachment at one year at the level of security vs. insecurity of attachment.

A logistic regression analysis was performed with security of attachment at 12 months as the DV and social support (IPRI SS scale scores), financial (on benefits) and INCAS scores as predictor variables. A total of 21 cases was analysed. The data were analysed firstly with caregiving represented by INCAS Total scores. Subsequent analyses were then performed with INCAS domain-level scores, and then dimension-level scores were entered into the equation. Due to low power, none of the individual variables was found to be a significant predictor of attachment security at one year. Results are therefore discussed in terms of full models only.

Where the INCAS was represented by the one Total score, the full model significantly predicted security of attachment at one year postpartum (omnibus chi-square = 12.28, df = 3, p = .006). The model accounted for between 44% and 60% of the variance in attachment security at one year, with 92% of secure attachments and 63% of insecure attachments predicted. Overall, 81% of predictions were accurate.

Where the INCAS was represented by two scores (Emotional Domain and Instrumental Domain), the full model significantly predicted security of attachment at one year postpartum (omnibus chi-square = 13.24, df = 4, p = .01). The model accounted for between 47% and 64% of the variance in attachment security at one year, with 85% of secure attachments and 63% of insecure attachments predicted. Overall, 76% of predictions were accurate.

Where the INCAS was represented by seven scores (Emotional Domain total and the six instrumental dimensions), the full model significantly predicted security of attachment at one year postpartum (omnibus chi-square = 27.91, df = 9, p = .001). The model accounted for between 73.5% and 100% of the variance in attachment security at one year, with 100% of secure attachments and 100% of insecure attachments predicted. Overall, 100% of predictions were accurate.

Conclusion

Results of the validity study demonstrate that the INCAS is sound with regard to its overall criterion, face, construct, concurrent, discriminant and predictive validity indicators. There were clear differences in the INCAS scores of those mothers who had been engaged by child protection services in comparison to those who were not under the notice of the services during the time of the study. Face validity was demonstrated by strong positive associations between the INCAS and the impressions of perinatal clinicians (measured on Visual Analogue Scales). There was also agreement between the INCAS and other measures of associated parenting sub-capacities, including parenting stress, parenting-related need, and maternal mind-mindedness. Very strong associations between the INCAS and NCAST supported the concurrent validity of the tool. Discriminant validity was demonstrated by the contrasting associations of the scale with measures of parenting stress and feeding sensitivity, whereby the INCAS related more strongly with an observational measure of caregiving behaviour than it did with a pen-and-paper measure of subjective experience (parenting stress). The emotional and instrumental domains diverged from one another with respect to their relatedness with additional measures of emotional and practical aspects of caregiving. Here, the Emotional Domain related more strongly to maternal mind-mindedness and feeding sensitivity, while the Instrumental Domain related more strongly to practical caregiving items on the Camberwell Assessment of Need for Mothers (CAN-M). Importantly, there were promising indications that the INCAS measures aspects of maternal care that are relevant to important longitudinal outcomes of the infant, including developmental milestones and attachment to the mother at one year of age.

Chapter 6: The Cognitive Hypotheses

This chapter describes the second phase of the study, where the newly validated INCAS was used to test a set of hypotheses relating to caregiving capacity, schizophrenia, and cognitive deficit during the postpartum period. A cross-sectional design was used and is described within the Methodology. Findings relating to the first, second and third cognitive hypotheses are presented in the Results section that follows.

Methodology

Design

Testing of the cognitive hypotheses incorporated a cross-sectional, between-groups comparison of the schizophrenia, clinical control (mood disorders) and healthy control groups. The clinical control group was included to control for the burden of psychiatric illness, including general psychopathology, medication and related adverse effects. The healthy control group was included to account for the generic cognitive effects of sleep deprivation, hormone fluctuation and preoccupation with the infant, all of which are associated with the postpartum period. Taken together, the two control groups isolated and made observable the effect of schizophrenia and schizophrenia-specific cognitive impairment upon early parenting capacity.

Clinical and diagnostic information, collected during the Intake Phase, were firstly controlled for. Parenting capacity scores (INCAS ratings) collected during the INCAS Validation were incorporated as the dependent variable. During this final phase of the study, cognitive assessment information was collected, and its significance as a predictor of parenting capacity was evaluated. A range of cognitions were of interest within the study.

The domains measured and the instruments incorporated to measure each are described below (see Table 68 for a summary).

Procedure

Computerised test batteries were used for neurocognitive assessment, while social cognitions were measured using a range of semi-structured interviews, sorting tasks, and pen-and-paper assessments. Computerised and interview-style assessments were completed during a face-to-face testing session. Face-to-face sessions were completed during home-visits where possible, depending upon residential status and the availability of broadband internet (needed for the WebNeuro™ test battery). At the session, participants were given the self-report social cognition assessment forms to be completed independently and returned in postage-paid envelopes. The cognitive assessment session took approximately 45 to 60 minutes to complete. Cognitive assessment information was combined with clinical and parenting information (collected during the Intake and Validation phases), and the cognitive hypotheses were then tested.

Participant flow

After moving through the Intake Phase and completing the baseline INCAS Validation session, the mothers took part in cognitive assessment. Cognitive testing took place no longer than 7 days after the INCAS Validation baseline session had been completed. For a summary of participant flow through cognitive testing.

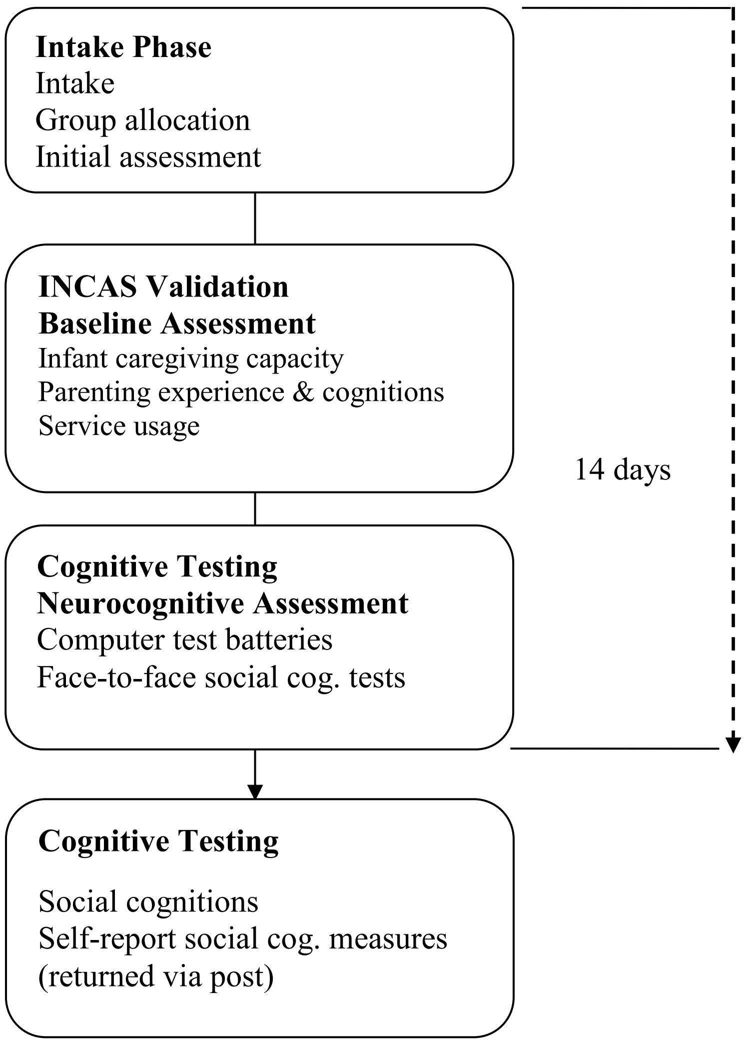


Figure 21. Participant flow through cognitive testing

Instruments

Instruments used to assess cognition (neurocognition and social cognition) have been summarised in Table 68, with detailed descriptions below.

Table 68. Cognitive assessment protocol

Assessment Point	Content	Measure/s	Modality	Infant age (months)
Intake Phase (complete)	Clinical assessment	(described previously)	Interview & self-report	1-4
INCAS Validation (baseline complete)	Early caregiving capacity	INCAS	Filmed observation	1-4
Neurocognitive assessment	Broad neurocognition	WebNeuro WCST	Computer test battery	1-4
Social cognitions	Facial affect recognition Empathy Theory of mind Attributional style	WN-EP IRI AIO HT IPSAQ	Self-report & interview	1-4

INCAS: Infant Caregiving Assessment Scales; WN: WebNeuro™; WCST: Wisconsin Card Sort Test; ICPT: Infant Cue Perception Task; WN-EP: Webneuro/Emotion-Processing; IRI: Interpersonal Reactivity Index; AIO: Attribution of Intention to Others; HT: Hinting Task; IPSAQ: Interpersonal, Situational and Personal Attribution Questionnaire.

Neurocognition

Broad Neurocognition

WebNeuro™ (Brain Resource Company, Ltd.)

WebNeuro™ (WN) is a computerised cognitive assessment battery with an automated stimulus presentation protocol (Silverstein et al., 2007). WN was adapted from IntegNeuro™, a touch-screen battery of neurocognitive tests that index a broad range of cognitions with documented validity against widely accepted pen-and-paper neuropsychological tests, together with demonstrated test-retest reliability and cross-cultural consistency (Mathersul et al., 2009; Paul et al., 2005; Williams et al., 2005). For the current study, the web-based administration protocol of WN enabled postpartum mothers to be tested with minimum inconvenience within the home.

Five domains of cognitive function are measured by the WN test battery. These include sensorimotor, memory, executive planning, attention and emotion perception[2]. Additionally, WN contains a "spot-the-real-word" test which provides an approximate intelligence score. The WN test battery takes approximately 30 minutes to complete. WN domains and subtasks are summarised in Table 69.

Table 69. Webneuro™ domains and subtasks

Domain	Subtasks
Sensorimotor	Motor tapping Choice reaction time
Attention	Continuous performance task Switching of attention Go-No-Go
Executive function	Maze
Memory	Memory recognition Digit span Emotion Memory*
Social cognition	Emotion Identification (% Accuracy & Reaction Time)
Intelligence	Spot-the-real-word

*contained within the Emotion Identification Task.

During the course of the study, WN was updated to a newer edition. While the subtasks remained the same, they were reorganised under slightly changed domains, displayed in Table 70. The revised version did not contain an Intelligence Domain.

[2]The Emotion Identification Task contained within the WN test battery was used as an index of social cognition in the current study. A full description can be found below.

Table 70. Revised Webneuro™ domains and subtasks

Domain	Subtasks
Response Speed	Motor tapping
Impulsivity	Go-No-Go
Attention	Continuous Performance Task
Information Processing	Switching of Attention Choice Reaction Time
Memory	Memory Recognition Digit Span
Executive functioning	Maze
Emotion Identification	Emotion Identification (% Accuracy & Reaction Time)
Emotion Bias	Emotion Identification (calculated using Reaction Time differentials)

WebNeuro Scoring

Participant responses were scored with an automated software program. Upon completion of the battery, an individually scored and normed cognitive profile was generated for each participant and sent to the investigator in electronic form.

Wisconsin Card Sort Test (WCST)

The Wisconsin Card Sort Test (WCST)(Heaton, 1981; Heaton et al., 1993) measures abstract reasoning, cognitive flexibility, and the extent to which perseverative thinking is reverted to in times of high cognitive demand. Errors relating to perseverative responding are agreed to identify a limitation in cognition that has been extensively documented in schizophrenia research (Heaton et al., 1993).

The WCST is a widely used and validated assessment tool and is currently a gold-standard measure of executive functioning. It requires the participant to develop and maintain a problem-solving strategy that works across changing stimulus conditions, using feedback in order to do so (Heaton et al., 1993). The WCST was included within this study to supplement the Webneuro™ by providing a targeted and fine-grained assessment of executive functioning. Additionally, the WCST will enable a wider comparison of results with prior studies of cognitive function in schizophrenia.

Participants in the current study completed a computerised version of the WCST (Heaton, 2000). As with the manual version, the computer display comprises four stimulus cards, with test cards presented one at a time beneath the stimulus row. Participants sorted each test card by placing it via mouse response under one of the four stimulus cards. The response cards differed along three dimensions: colour (red, green, yellow, or blue), form (triangle, star, cross, or circle), and number, with each having from one to four triangles, stars, crosses, or circles.

During testing, participants were required to deduce the constantly changing sorting principle from computer-generated audio feedback. The participant was never told the correct sorting principle, only whether each response was right or wrong. Once a particular response mode had been established (where the participant had achieved 10 consecutive correct responses), a new sorting principle was instituted without warning, requiring the participant to use the feedback to develop a new sorting strategy.

The WCST is found to differentiate between groups known to have contrasting neurocognitive (and particularly executive) abilities (Green, 2007). In particular, the WCST is a sensitive marker of those cognitive deficits that are specific to schizophrenia, relative to both clinical and healthy control populations (Frangou et al., 2006; Nestor, Niznikiewicz, & McCarley, 2010; Polgar et al., 2010; Prentice, Gold, & Buchanan, 2008; Rusch et al., 2008; Thurston-Snoha & Lewine, 2007; Waford & Lewine, 2010).

Social cognitions

In addition to the facial affect recognition task contained within the WebNeuro™ battery, measures of empathy, theory of mind, and attributional style were also included in the study as hypothesised predictors of early parenting capacity.

Emotion processing & facial affect recognition

Webneuro™ Emotion Identification Task

The WN Emotion Identification subtest was used within the current study to index maternal emotion processing and facial affect recognition. The task comprises 72 facial expression stimuli, which are photographed images of 12 adult faces (six females, six males), each depicting neutral, happy, fearful, sad, angry, and disgusted expressions[3]. The WN Emotion Identification task measures two components of emotion processing: *immediate explicit emotional identification* and *implicit emotion recognition*.

Explicit emotion identification

Within this component of the task, 48 of the face stimuli (8 individuals depicting 6 expressions) were presented in a pseudorandom sequence, for two seconds each. Participants identified the verbal label for each expression from six presented options. Selection was made via mouse click. Emotion identification accuracy and reaction time (RT) were recorded.

Implicit emotion recognition

This task was presented approximately 20 minutes after the explicit emotion identification task, following several unrelated interim tasks. Following the protocol set out in Williams et al (2008), implicit emotion recognition was assessed with a repetition priming

[3]Derived from the standardised and normed set developed by Gur and colleagues (Gur et al., 2002).

protocol, where the previous explicit identification of emotion served as the 'study' phase. The implicit condition used 48 face stimuli. For each participant, 24 face stimuli (two females and two males, depicting each of the six expressions listed above) were randomly selected from the faces presented in the previous explicit identification condition. These stimuli were presented along with a new set of 24 face stimuli (also comprising two females and two males depicting happiness, fear, anger, sadness, disgust and neutral expressions), in a pseudorandom order. Participants indicated (via mouse click) the faces that they recognized from the original list presented under the *explicit emotion identification* condition. The dependent measures of interest were the accuracy, reaction time, and variability of reaction time for correctly recognized faces. In this way, the effect of prior exposure to emotional expressions, together with the differential effects of prior exposure on accuracy and reaction time between emotions, were measured.

Within a large study by Williams and colleagues (2008), internal consistency (Cronbach's alpha) for the *Explicit Emotion Identification Test* was .79 (Williams et al., 2008). The Cronbach's alpha statistic for *Implicit Emotion Recognition* was .81. Within the current study, internal consistency (Cronbach's alpha) for the *Explicit Emotion Identification Test* was .71, while for *Implicit Emotion Recognition,* it was .87.

Empathy

Interpersonal Reactivity Index (IRI)

Affective and cognitive empathy were assessed using the Interpersonal Reactivity Index (IRI)(Davis, 1980, 1983). Participants respond to items on a five-point likert scale, with 'does not describe me well' at one end, and 'describes me very well' at the other (for full scale, see Appendix 21). The four-scale structure of the IRI illustrates the author's position that empathy is a four-part construct. The four seven-item subscales of the IRI include:

1. Perspective Taking
2. Fantasy Scale
3. Empathic Concern
4. Personal Distress

The *Perspective Taking* and *Fantasy Scale* measure the cognitive component of empathy, while the *Personal Distress* and *Empathic Concern* scales measure the affective components of empathy. Perspective Taking (PT) measures the self-reported tendency to spontaneously adopt the psychological point of view of others in everyday life, e.g. *"I sometimes try to understand my friends better by imagining how things look from their perspective".* The Empathic Concern (EC) scale measures the tendency to experience feelings of sympathy and compassion for unfortunate others, e.g. *"I often have tender, concerned feelings for people less fortunate than me".* The Personal Distress (PD) scale measures the tendency to experience distress and discomfort in response to extreme distress in others, e.g. *"Being in a tense emotional situation scares me".* The Fantasy Scale (FS) measures the tendency to imaginatively transpose oneself into fictional situations, e.g. *"When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me".*

Original validation data indicated satisfactory internal and test-retest reliabilities of the instrument, with internal reliabilities ranging from .71 to .77 and test-retest reliabilities ranging from .62 to .71 (Davis, 1980). The IRI has been widely used in schizophrenia research (Haker & Rossler, 2009; Montag, Heinz, Kunz & Gallinat, 2007; Shamay-Tsoory et al., 2007). Within the study at hand, internal consistency of the scales was adequate (α=.78

for Perspective Taking, .80 for Fantasy, .73 for Empathic Concern, and .74 for Personal Distress).

Theory of Mind

Comic Strip Task: Attribution of Intentions to Others (AIO)

The Attribution of Intentions to Others task (AIO) comprises a validated series of 28 comic strips (Sarfati et al., 2003). The AIO assess the ability to mentalise a set of thoughts and feelings on behalf of another individual (depicted in a cartoon). Each test item comprises a sequence of three pictures sketched in black ink that show a character performing an action motivated by an easily recognisable desire or intention. The comic strips involved human figures whose behaviour in the correct answer could be predicted by inferring their intentions (see Appendix 22 for example).

Participants were required to understand the character's volitional mental state and demonstrate this understanding by selecting the option (a fourth picture) which was the most likely (of three options presented) to be the final pane of the comic strip. Among the three possible responses, only one made sense in relation to the prior three pictures. False and correct answers were scored 0 and 1 point, respectively. Total scores were calculated by summing item scores (Brunet et al., 2003; Sarfati et al., 1997).

The AIO was adapted from an original version which had been developed to assess theory of mind in people with schizophrenia (Sarfati et al, 1997). The task has since been used extensively in research involving participants with schizophrenia (e.g.; Brunet et al., 2003; Chung, Kang, Shin, Kwon, 2008; Sarfati & Hardy-Bayle, 1999; Sarfati et al., 1997; Sarfati et al., 1999;; Sprong, Schothorst, Vos, Hox & vn Engeland, 2007). Within the current study, internal consistency was acceptable (α=.84).

Hinting Task

The Hinting Task (HT) (Corcoran, Mercer & Frith, 1995) was incorporated to assess the ability of participants to infer intentions behind the indirect speech utterances of others (Marjoram et al., 2006). The HT comprises 10 short scenario descriptions, each involving two characters. The scenarios were read aloud to participants by the investigator[4]. Each of the scenarios ends with one of the characters dropping an obvious hint. The participant was then asked to demonstrate a form of theory of mind by stating what they believed the character had been hinting at. An appropriate first response (an intuitive guess) was awarded a score of two. Where the participant gave an incorrect first response, a more obvious hint was added to the story. A correct response to this second probe was given a score of one. If the participant failed again to give a correct response, a score of zero was given. A total score was calculated by summing each of the scenario scores. Example items are displayed in Appendix 23.

The Hinting Task has good face validity for the schizophrenia population, as demonstrated within a number of studies which explored the schizophrenia-specific theory of mind deficit (e.g.; Bora, et al., 2006; Bora et al., 2009; Corcoran et al., 2003; McGlade, 2008). In most cases (with the exception of Bora et al. 2006), the Hinting Task has been found to discriminate between schizophrenia and non-schizophrenia samples. The Hinting Task demonstrated adequate internal consistency within the current sample (α=.75).

Attributional style

Interpersonal, Personal, and Situational Attributions Questionnaire

The Interpersonal, Personal, and Situational Attributions Questionnaire (IPSAQ)(Kinderman & Bentall, 1996) was originally designed to examine the effects of

[4]Where required, scenarios were repeated for participants to compensate for the poor prose recall often ocurring in schizophrenia.

paranoia and depression upon attributional style. For this reason, the IPSAQ has proven useful in schizophrenia research (e.g.; Donohoe et al., 2008; Humphreys & Barrowclough, 2006; Mizrahi, Addington, Remington, & Kapur, 2008).

The IPSAQ comprises 32 items that describe a number of commonly experienced social situations, including 16 positive situations (e.g. "*a friend tells you that she respects you"*) and 16 negative situations (e.g. *"a friend talks about you behind your back"*) (example items provided in Appendix 24).

Situations are described in the second person. For each item, the respondent is required to write down a single most likely causal explanation for the situation described. The respondent is then required to categorise this cause as being either internal (something to do with the respondent), personal (something to do with another person or persons) or situational (something to do with circumstances or chance) (Kinderman & Bentall, 1996). Three positive and three negative subscale scores are generated for both the positive and negative items by summing the number of internal, personal and situational attributions for each (see Table 71).

Two cognitive bias scores are derived from these six subscale scores. Externalising Bias (EB) is calculated by subtracting the number of internal attributions for negative events from the number of internal attributions for positive events. This score can serve as a measure of self-blame. A positive EB score would point to a tendency for self-serving biases (i.e. blaming the self less for negative events than for positive events), whereas a negative EB score would indicate a tendency for self-blame (i.e. where the self is blamed more for negative events than for positive events (Kinderman & Bentall, 1996). A Personalising Bias (PB) indicates the proportion of external attributions for negative events which are personal as opposed to situational, calculated by dividing the number of personal attributions by the sum of both personal and situational attributions for negative events (Kinderman & Bentall, 1996).

Table 71. Items, subscales and cognitive bias scores of the IPSAQ

Items	Subscales: attributions (n)	Label	Cognitive bias scores
		Pi	1. Externalising Bias (EB)
Positive situations	1. Internal		
	2. Personal	Pp	= Pi – Ni
	3. Situational	Ps	
Negative situations	4. Internal	Ni	2. Personalising bias (PB)
	5.Personal	Np	= Np / (Np + Ns)
	6. Situational	Ns	

A PB score of greater than 0.5 therefore represents a greater tendency to use personal rather than situational external attributions for negative events.

Within a healthy sample, reliability statistics (Cronbach's alpha) revealed acceptable levels of internal reliability for the six subscales (Positive-Internal α = .72; Positive-Personal α = .61; Positive-Situational α = .61; Negative-Internal α = .73; Negative-Personal α = .63; Negative-Situational α = .76). Within the current population, internal consistency of all six subscales was adequate (Positive-Internal α = .73; Positive-Personal α = .65; Positive-Situational α = .74; Negative-Internal α = .86; Negative-Personal α = .82; Negative-Situational α = .85).

Statistical Analysis

To test the first cognitive hypothesis, that *there is a cognitive deficit within the schizophrenia group, relative to healthy and clinical control groups,* an analysis of variance (ANOVA) with post-hoc testing was used to examine all neurocognitive and social cognitive variables for between-group differences.

To test the second cognitive hypothesis, that *cognition would be found to independently account for a significant proportion of the variance in early caregiving capacity, as indexed by the INCAS*, the relationship between illness-associated features (diagnostic category, symptomatology and medication) and early caregiving capacity (INCAS Total, Domain and Dimension scores) were first explored using Pearson's product-moment correlations (Pearsons *r*, two-tailed). Clinical variables were then examined for significance as predictors of parenting capacity (INCAS scores) using multiple linear regression (with step-wise entry of predictor variables). Here the criterion variable was early caregiving capacity (INCAS Total and Domain scores) and the independent (predictor) variables included baseline clinical variables of participants, together with confounders (sociodemographic variables significantly related to INCAS scores).

Cognitive variables were then examined for significance as predictors of parenting capacity. This was explored first in terms of the strength of their correlation with INCAS scores (using Pearson's *r*, two-tailed), and then in combination with the clinical variables using stepwise multiple linear regression. Here, the criterion variable was early caregiving capacity (INCAS Total and Domain scores) and the independent (predictor) variables included the cognitive variables, together with previously identified confounders (clinical and sociodemographic variables significantly related to INCAS scores).

Due to the high number of individual cognitive variables and the small overall sample size, key neurocognitive variables were condensed into one single variable via Principal Components Analysis so that neurocognition could also be examined as one combined variable. The same was undertaken for measures of social cognition. All factors with eigenvalues of 1 or greater were included in the analysis. The new variables (Neurocognition and Social Cognition) were computed by summation of component item *z*-scores. Sampling adequacy and factorability were examined using Bartlett's test of Sphericity and the Kaiser-Meyer-Olkin (KMO) test. Internal consistency of component items were examined using Cronbach's alpha coefficient (Cronbach, 1951).

After analysing the significance of clinical variables on the whole study sample, further analyses were completed to investigate the effects of schizophrenia-specific symptomatology upon early caregiving in the mothers with schizophrenia, and *to test whether cognition exerts an impact upon the caregiving capacity of this group, independently of these symptoms*. As for the analyses involving the whole sample, the effects of psychotic symptoms, depression, and antipsychotic medication dosage were investigated through use of correlations (Pearson's *r*, two-tailed) and multiple linear regressions (using the Enter method). Here the criterion variable was early caregiving capacity (INCAS Total and Domain scores) and the independent (predictor) variables included baseline clinical variables of the schizophrenia group, together with confounders (sociodemographic variables significantly related to INCAS scores).

Cognitive variables were then examined for significance as predictors of early parenting capacity within the schizophrenia group using the condensed Neurocognition and Social Cognition variables due to small number of participants in the Schizophrenia group (n=13). In this case, the criterion variable was early caregiving capacity (INCAS Total and Domain scores) and the independent (predictor) variables included the cognitive variables, together with previously identified confounders (schizophrenia-specific clinical and sociodemographic variables significantly related to INCAS scores).

The condensed Neurocognition and Social Cognition variables were used to test the third cognitive hypothesis, which was that neurocognition affects early infant caregiving capacity indirectly, via its influence upon social cognition. Path analyses were undertaken to test the relationship between neurocognition, social cognition, and early infant caregiving capacity using SPSS Version 21.0 with AMOS Version 7.0 (Arbuckle, 2006). The analyses included the whole study sample (n=51). Missing data were handled by estimating means with the Maximum Likelihood procedure. In the first path analysis (the basic model), Neurocognition and Social Cognition were exogenous variables, while INCAS Total scores served as the dependent variable. In the second path analysis (the mediation model), Neurocognition was treated as the exogenous variable, while Social Cognition was treated as the mediating variable.

Three different goodness-of-fit statistics were used, including the model relative chi square (X^2/df)(Wheaton, 1977), the comparative fit index (CFI) (Bentler, 1990) and the root mean square error of approximation (RMSEA) (Steiger, 1990). These fit statistics were selected due to their usefulness in studies with small sample sizes (Hooper, 2008). The CFI compares the proposed model with an independence model, a null model that assumes all variables are unrelated with the dependent variable. A model that fits well with the data has a X^2/df ratio of less than 3 (Kline, 1998), a CFI of greater than 0.90 (Hu, 1999), and an RMSEA less than 0.08 (Browne, 1993).

In all cases throughout this section, all findings relate to the entire study sample at baseline unless otherwise specified.

Results

Relationship of the INCAS to Maternal Cognition: The Cognitive Hypotheses

As established earlier, postpartum mothers with schizophrenia exhibit significantly poorer infant caregiving capacity (as indexed by the INCAS) than mothers from the healthy and clinical control groups. Within this phase of the study, cognitive information collected at baseline was analysed in order to:

a) examine between-group differences in neurocognitive and social cognitive variables;
b) examine the relationship between cognition and early parenting capacity, as measured by the INCAS; and
c) explore the extent to which aspects of cognition contribute to variance in maternal caregiving capacity.

The cognitive research questions were framed by a set of Cognitive Hypotheses, which will be discussed alongside findings.

During baseline assessment, participants completed a series of neurocognitive and social cognitive tests so that the cognitive hypotheses could be tested. This information was collected alongside information about early infant caregiving capacity. Participant flow through the cognitive testing was as follows:

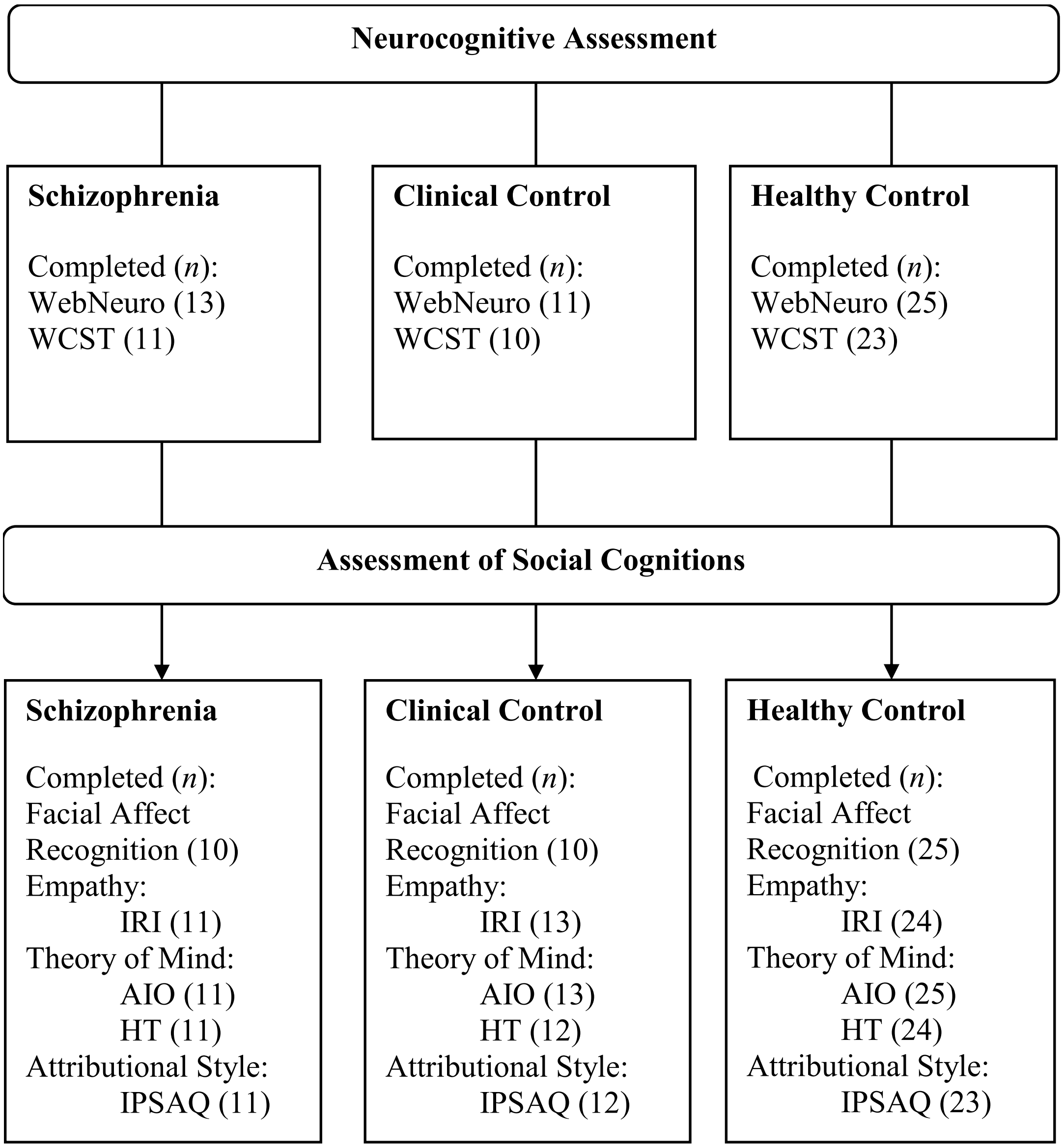


Table 72.Participant flow through cognitive testing.

All mothers with schizophrenia (n=13) completed the WebNeuro assessment battery. Two did not complete the Wisconsin Card Sort Test. Of these mothers, one had an aversion to shapes and pictures in association with her positive symptomatology, and the other opted not to complete this test as she felt fatigued by the demands of the WebNeuro battery.

Two mothers in the clinical control group (n=13) relocated during the study, and did not feel able to complete the computerised tasks (WebNeuro, Wisconsin Card Sort Test, and

Facial Affect Recognition) without in-person assistance. One further mother did not complete the Wisconsin Card Sort Test as she felt fatigued by the demands of the WebNeuro Battery. The same mother responded to the Facial Affect Recognition task in a way that was not consistent enough for reliable scoring.

All mothers in the healthy control group completed the WebNeuro test battery. Two mothers did not complete the Wisconsin Card Sort Test, one due to time constrictions, and the other because of technical difficulties with the program on the day of testing.

Ten mothers with schizophrenia completed the Facial Affect Recognition task. Three of the mothers responded too erratically for valid scores to be calculated. Eleven of the mothers in the schizophrenia group completed the remaining social cognition assessments. One mother did not complete the comic strip tasks due to her aversion to shapes and pictures, two mothers refused the Hinting Task for reasons not specified, and one mother refused to complete the IPSAQ as she became angry when having to remember past disagreements, as required by this questionnaire. Remaining questionnaires which were not completed were re-posted and followed up with reminder calls; however these remained incomplete for reasons unspecified by the mothers.

One mother in the clinical control group declined to complete the Hinting Task for reasons unspecified, while another chose not to complete the IPSAQ as she found the process of imagining various social situations agitating. All other mothers in the clinical control group completed the social cognition assessments.

All mothers in the healthy control group completed the Facial Affect Recognition task. One mother failed to return her empathy and attributional style measures for reasons unspecified. Upon resending and follow-up, the forms remained incomplete. One mother was unable to complete the Hinting Task due to an unwell baby on the day of testing, and another mother refused to complete the IPSAQ for reasons unspecified. Unless otherwise specified, all findings relate to the entire study sample at baseline.

Cognitive Hypothesis 1: Between-group Differences in Cognition

Hypothesis IV) *There will be a cognitive deficit within the schizophrenia group, relative to healthy and clinical control groups. Specifically;*

c. *Postpartum mothers with schizophrenia will exhibit significantly lower neurocognitive scores than the clinical and healthy control groups.*
d. *Postpartum mothers with schizophrenia will exhibit significantly lower social cognition scores than the clinical and healthy control groups.*

Neurocognitive functioning was measured with the WebNeuro (Silverstein et al., 2007) test battery, with results presented in *z*-score form as generated by the computerised scoring system. Overall, mothers with schizophrenia scored the lowest on all areas of neurocognitive functioning. A one-way ANOVA revealed a significant effect of study group membership on Response Speed ($F(2,45) = 3.99$, $p = .025$), Impulsivity ($F(2,46) = 4.23$, $p = .021$), Information Processing ($F(2,46) = 4.28$, $p = .02$), Memory ($F(2,46) = 4.24$, $p = .02$) and Executive Functioning ($F(2,46) = 4.35$, $p = .019$). Post hoc testing showed all of these significant differences to be between the schizophrenia and healthy control groups (Response Speed, $p = .022$; Impulsivity, $p = .017$; Information Processing, $p = .02$; Memory, $p = .028$; Executive Functioning, $p = .021$). There were no significant between-group differences when comparing the two control groups, or the two clinical groups to one another. There were no other significant between-group differences in WebNeuro composite scores.

Results are displayed in Table 73 and presented graphically in Figure 22 below.

Table 73. Neurocognitive Results across Study Groups

Neurocognitive domain	Schizophrenia (n=13) μ(s.d.)		Clinical Control (n=11) μ(s.d.)		Healthy Control (n=25) μ(s.d.)		Sig. (p)
Response speed	-1.75	(2.00)	-.65	(1.33)	-.35	(1.15)	.025
Impulsivity	-.41	(1.18)	.11	(.79)	.49	(.78)	.021
Attention	-1.04	(1.55)	-.65	(1.19)	-.25	(1.15)	ns
Information Processing	-.72	(.88)	-.07	(.70)	0	(.68)	.020
Memory	-1.22	(1.36)	-.12	(1.48)	-.17	(.79)	.020
Executive Functioning	-.71	(1.68)	-.34	(.80)	.34	(.76)	.019
Emotion Reaction Time	-1.24	(.75)	-.89	(1.43)	-.87	(1.27)	ns
Emotion bias	-.52	(.94)	-.95	(1.53)	-.65	(1.32)	ns

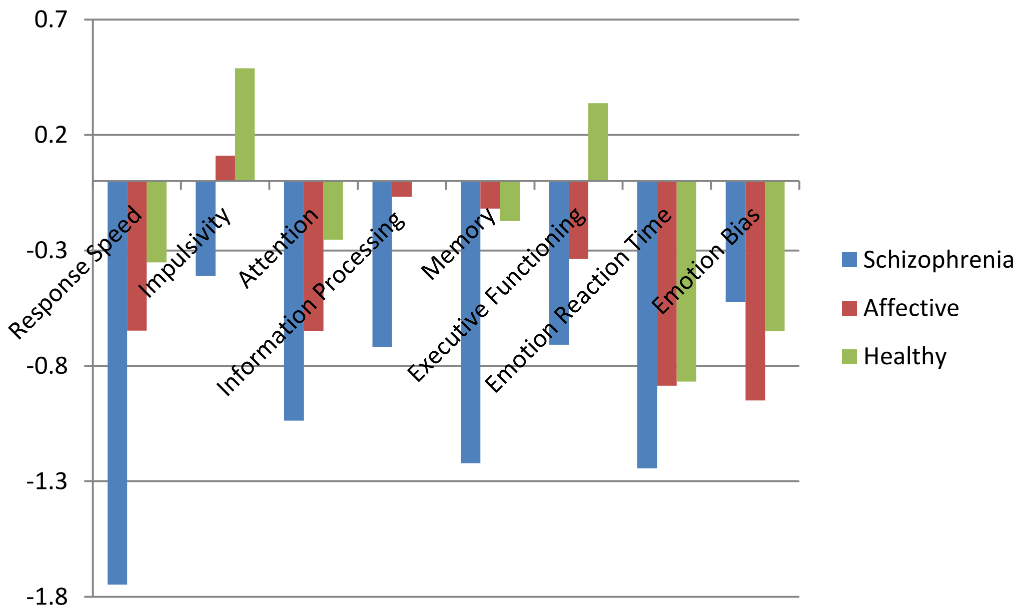


Figure 22. Mean neurocognitive results across study group.

Due to the large number of possible variables available on the Wisconsin Card Sort Test, following Heinrichs and Zakzanis (1998), results were restricted to perseverative responses, categories, perseverative errors, total errors and percent conceptual level responses. A one-way ANOVA highlighted significant between-group differences on Total Errors (F(2,40)=3.31, p=.047), Number of Perseverative Responses (F(2,40)=3.48, p=.041), and Number of Perseverative Errors (F(2,40)=3.34, p=.045). Post-hoc testing showed all of these differences to be between the schizophrenia and healthy control groups. The schizophrenia group performed more poorly than healthy controls on Number of Perseverative Responses (*p*=.042). Despite significant overall between group differences, however, post–hoc testing revealed that the differences between schizophrenia and healthy control group mothers were only marginally significant for Number of Total Errors (*p*=.081) and Number of Perseverative Errors (*p*=.050), with mothers in the schizophrenia group performing more poorly than those in the healthy control group. Results are summarised in Table 74.

Table 74. Wisconsin Card Sort Test Results across Study Groups

WCST Standard Scores	Schizophrenia (n=10) μ(s.d.)		Clinical Control (n=10) μ(s.d.)		Healthy Control (n=23) μ(s.d.)		Sig. (*p*)
Total errors	21.30	(14.37)	19.40	(14.24)	12.43	(4.68)	.047
Perseverative responses	14.00	(11.96)	10.40	(9.79)	6.61	(2.59)	.041
Perseverative errors	12.10	(9.59)	9.50	(7.93)	6.30	(2.59)	.045
Nonperseverative errors	9.20	(5.47)	9.90	(6.56)	6.13	(3.32)	ns
% conceptual lvl. responses	73.10	(13.93)	76.10	(12.72)	81.87	(6.08)	ns

Facial affect recognition was measured by the WebNeuro test battery emotion identification task (Silverstein et al., 2007), with results presented in *z*-score form as generated by the computerised scoring system (Table 59). To correct for multiple comparisons, significance for between-group differences was set at $p \leq .01$. As described in detail in Chapter 6, the WebNeuro emotion processing task is made up of two components: *immediate explicit emotional identification* (indexed by Emotion Recognition scores) and *implicit emotion recognition* (indexed by Emotion Memory scores). The schizophrenia groups demonstrated an impaired capacity relative to other groups in their recognition and memory for facial affect. Between-group differences were found to reach statistical significance for the Emotion Memory item; 'Disgust - reaction time' ($F(2,42) = 10.21$, *p*

<.001), together with the Emotion Recognition item; ‘Happy - reaction time’ ($F(2,42) = 6.08$, p =.005). Post hoc testing showed the schizophrenia group to be significantly lower than the clinical (p <.001) and healthy (p =.003) control groups regarding the speed with which they were able to react to faces exhibiting ‘disgust’. The schizophrenia group also scored significantly lower than the clinical (p =.018) and healthy (p =.006) control groups regarding the speed with which they were able to recognise happy affect on faces. There were no other significant between-group differences on the WebNeuro Emotion Identification items.

Table 75. WebNeuro Facial Affect Recognition, Memory and Reaction Time across Study Groups

WN Task μ(s.d.)	Schizophrenia (n=10)		Clinical Control (n=10)		Healthy Control (n=25)		Sig. (p)
Emotion memory							
Fear %	-.11	(.38)	0.00	(.03)	.02	(.04)	ns
Fear RT	-.71	(1.20)	.02	(.43)	-.48	(.85)	ns
Angry %	-.60	(1.10)	.11	(.01)	.05	(.39)	ns
Angry RT	-.74	(1.44)	.33	(.65)	-.44	(1.09)	ns
Disgust %	-.08	(.62)	.10	(.02)	.12	(.03)	ns
Disgust RT	-1.70	(1.37)	.24	(.63)	-.37	(.93)	<.001
Sad %	-.13	(.98)	.18	(.03)	.11	(.45)	ns
Sad RT	-.51	(1.27)	-.12	(.53)	-.32	(.92)	ns
Happy %	.23	(.65)	.42	(.02)	.44	(.04)	ns
Happy RT	-.32	(1.20)	.29	(1.25)	.20	(.92)	ns
Neutral %	-.13	(.67)	.19	(0.00)	-.09	(.67)	ns
Neutral RT	-.64	(1.26)	-.18	(.74)	-.33	(1.04)	ns
Emotion Recognition							
Fear %	-.29	(.86)	-.05	(.66)	.07	(.92)	ns
Fear RT	-.83	(.72)	-.13	(1.61)	-.42	(1.02)	ns
Angry %	0.00	(1.43)	-.11	(1.17)	.15	(.98)	ns
Angry RT	-.95	(.84)	-1.02	(1.28)	-.70	(1.21)	ns
Disgust %	-.38	(.87)	-.08	(.72)	.08	(1.00)	ns
Disgust RT	-.72	(.71)	-.53	(.85)	-.72	(1.10)	ns
Sad %	-.21	(.66)	-.26	(.73)	.16	(1.07)	ns
Sad RT	-.65	(.92)	-.41	(.92)	-.46	(.96)	ns
Happy %	-.29	(.95)	-.22	(.96)	.14	(.46)	ns
Happy RT	-1.35	(.92)	-.23	(.72)	-.29	(.89)	.005
Neutral %	-.28	(.77)	-.38	(.80)	.49	(1.04)	ns
Neutral RT	-.64	(1.08)	-.13	(.73)	-.42	(.91)	ns

RT= Reaction Time; % = percent accuracy

There were no significant between-group differences in empathy scores, as measured by the Interpersonal Reactivity Index (Table 60). Lowest 'Empathic Concern' and 'Fantasy Scale' scores were observed in the schizophrenia group. Clinical control group mothers scored lowest on the 'Perspective Taking' scale, while healthy controls reported the least 'Personal Distress' in relation to the distress of others.

Table 76. Empathy Scores across Study Groups

IRI Domain	Schizophrenia (n=11) μ(s.d.)		Clinical Control (n=13) μ(s.d.)		Healthy Control (n=24) μ(s.d.)		Sig. (p)
Empathic concern	25.6	(3.7)	28.0	(6.1)	28.1	(3.9)	ns
Perspective taking	24.9	(4.6)	24.2	(4.9)	25.5	(5.2)	ns
Personal distress	17.8	(3.3)	20.5	(4.8)	17.3	(5.9)	ns
Fantasy	19.3	(5.5)	23.1	(6.1)	22.5	(5.7)	ns

IRI: Interpersonal Reactivity Index.

A one-way ANOVA showed a significant effect of study group membership on both the Comic Strip ($F(2,46) = 4.93$, $p = .012$) and Hinting Task ($F(2,42) = 6.36$, $p = .004$) theory of mind instruments (see Tables 61 & 62). For the Attribution of Intention to Others (comic strip) task, the schizophrenia group scored significantly lower on average than healthy control group mothers ($p = .013$). Additionally, the schizophrenia group scored significantly lower than both clinical ($p = .022$) and healthy ($p < .001$) control group mothers on the Hinting Task. Taken together, pronounced impairment in theory of mind was observed in conjunction with schizophrenia, relative to affective illnesses and healthy controls.

Table 77. Attribution of Intention to Others (Comic Strips): Total Scores by Study Group

	Schizophrenia (n=11) μ(s.d.)		Clinical Control (n=13) μ(s.d.)		Healthy Control (n=25) μ(s.d.)		Sig. (*p*)
AIO total correct	22.4	(5.5)	23.9	(4.0)	26.1	(1.5)	.012

Table 78. Hinting Task: Total Scores by Study Group

	Schizophrenia (n=11) μ(s.d.)		Clinical Control (n=12) μ(s.d.)		Healthy Control (n=24) μ(s.d.)		Sig. (*p*)
HT Total Score	14.7	(3.8)	17.4	(2.2)	18.3	(1.3)	.004

There was a significant overall between-group difference found for total number of positive events attributed to external situational factors ($F(2, 42) = 6.36$, p =.004) on the Internal, Personal and Situational Attributions Questionnaire (IPSAQ), a measure of attributional style (Table 63). Schizophrenia group mothers attributed positive events to external situational factors on a more frequent basis than did both Healthy (p =.027) and Clinical (p =.004) Controls. No other between-group differences in attributional style were found to be significant. Mothers with schizophrenia tended to attribute positive events to situational factors more frequently than the two control groups. They attributed negative events to internal (self) factors the least, relative to clinical and healthy controls. Mothers with affective illnesses tended to attribute negative events to others the most frequently in comparison to other groups, and overall, they exhibited highest ‘Externalising’ and ‘Personalising’ bias scores; however these differences did not reach significance.

Table 79. Attributional Style across Study Groups

Attributional style	Schizophrenia (n=11) μ(s.d.)		Clinical Control (n=12) μ(s.d.)		Healthy Control (n=23) μ(s.d.)		Sig. (p)
Positive events							
Internal	8.1	(4.6)	10.5	(2.9)	9.1	(2.5)	ns
External, Personal	2.7	(3.0)	4.2	(2.5)	3.7	(2.4)	ns
External, Situational	6.1	(3.1)	2.3	(2.1)	3.4	(2.7)	.004
Negative events							
Internal	5.6	(5.4)	6.4	(3.7)	5.8	(3.9)	ns
External, Personal	7.1	(6.2)	7.8	(3.2)	6.5	(3.2)	ns
External, Situational	4.7	(4.7)	3.0	(2.4)	3.8	(4.0)	ns
Attributional Bias							
Externalising Bias	2.6	(4.1)	4.1	(2.5)	3.3	(3.8)	ns
Personalising Bias	.5	(.4)	.7	(.2)	.7	(.3)	ns

These findings support the hypothesis that a diagnosis of schizophrenia is associated with deficits in neurocognition and social cognition. The schizophrenia group exhibited impairment relative to the healthy control group in several areas of neurocognition, including response speed, impulsivity, information processing, memory and executive functioning. There were also deficits in the schizophrenia group relative to both healthy and clinical controls in areas of social cognition including facial affect recognition, theory of mind, and attributional style.

Cognitive Hypothesis 2: Cognition and Parenting Capacity

Hypothesis V) *Where other significant predictors of parenting capacity are held constant, cognition will independently account for a significant proportion of variance in early caregiving capacity, as indexed by the INCAS;*

c. Neurocognitive deficits (associated with schizophrenia) will independently account for a significant proportion of impairment to postpartum parenting capacity.

d. Deficits in social cognition (associated with schizophrenia) will independently account for a significant proportion of impairment to postpartum parenting capacity.

To test Hypothesis 2, the relationship between illness-associated features (diagnostic category, symptomatology and medication) and early caregiving capacity (INCAS Total, Domain and Dimension scores) were first explored using Pearson's *r* correlations. Clinical variables were then examined for significance as predictors of parenting capacity using multiple linear regression.

Cognitive variables were then examined for significance as predictors of parenting capacity. This was explored first in terms of the strength of their correlation with INCAS scores (using Pearson's *r*), and then in combination with the clinical variables using stepwise multiple linear regression. Here, significant clinical variables were held constant while the contribution of cognitive variables was examined for significance. In this way, the assertion that cognition accounts for a significant proportion of the variability in parenting capacity above and beyond illness-related features was investigated statistically.

Due to the high number of individual cognitive variables and the small overall sample size, key neurocognitive variables were condensed into one single variable via principal components analysis so that neurocognition could also be examined as one combined variable. The same procedure was undertaken for measures of social cognition. Findings are presented below.

Relationship between Illness-Related Features and Early Caregiving Capacity

Descriptive data for clinical variables across study groups have been described earlier (see Participant Intake). Correlations with caregiving capacity, indexed by the INCAS, are summarised below. While investigating the interactions with clinical profile, only the relationships between variables and INCAS Total and Domain scores are discussed here because of difficulties presented by such a large number of statistical tests. Dimension-level correlations are displayed in Appendix 25.

Symptoms of depression, anxiety and stress (as measured by the Depression, Anxiety and Stress Scales; DASS) (Lovibond & Lovibond, 1995) were inversely related with INCAS Total, Emotional and Instrumental Domain scores (Table 80). There was a particularly strong relationship between Anxiety and Emotional caregiving as indexed by INCAS Emotional Domain scores (r = -.50, n =48, p <.001). INCAS Total scores were also significantly related to DASS Anxiety scores (r = -.40, n =48, p =.006). As well as Anxiety, Emotional Domain scores were significantly related to Depression (r = -.36, n =48, p =.012) and Stress (r = -.33, n =48, p =.022).

Table 80. Correlations (r) between the INCAS and the DASS

	Emotional Domain (n =48)	Instrumental Domain (n =49)	INCAS Total (n=48)
Depression	-.36*	-.07	-.27
Anxiety	-.50**	-.18	-.40**
Stress	-.33*	-.12	-.27

**p< .01; *p< .05 (2-tailed)

Mania was measured in the clinical control group with the Mania Rating Scale (MRS) (Young et al., 1978). Within the clinical control group, no significant manic symptomatology was detected by the MRS. As there was no significant mania in the mothers, nor any significant correlations between the MRS and the INCAS (see Appendix 26), it was excluded from subsequent analyses in order to keep variables to a minimum.

Multiple Linear Regression was used to further examine the link between psychiatric symptomatology and early infant caregiving capacity, as measured by the INCAS. Here, potentially confounding variables were held constant to enable a more accurate picture of the relationship. For INCAS Total and Domain scores, a regression analysis was performed with symptom scale scores, medication levels and maternal diagnostic category entered as independent (predictor) variables, and the relevant INCAS score as the criterion variable. Also entered into the model each time were potentially confounding variables (as determined while validating the INCAS). These included culture (East Asian/Caucasian) and parity. Predictor variables are listed in Table 81 below.

Table 81. Predictor Variables Entered into the Model with Three Study Groups Included

Variable	Index
Schizophrenia diagnosis	(yes/no)
Any psychiatric illness	(yes/no)
Depression	DASS Depression Scale Total
Anxiety	DASS Anxiety Scale Total
Stress	DASS Stress Scale Total
Parity	Birth order of study infant
Culture	(East Asian/Caucasian)

Using the stepwise method, a significant model was produced when INCAS Total score was entered as the criterion variable: $F(2, 42) = 13.52$, $p<.001$. The model explains 36.3% of the variance (adjusted $R^2=.363$). Table 82 gives information for the two significant clinical variables, diagnosis of schizophrenia and anxiety (as measured by DASS Anxiety Scale scores), which were the predictor variables retained in the model. All other variables were insignificant and therefore excluded from the model.

Table 82. Regression Coefficients for Maternal Schizophrenia and DASS Anxiety scores.

Variable	**B**	**SE B**	**β**	**Sig. (*p*)**
Schizophrenia	-7.96	2.05	-.47	<.001
Anxiety	-.45	.13	-.41	.001

A significant model was also produced when INCAS Emotional Domain score was entered as the criterion variable: $F(2, 42) = 13.59$, $p<.001$. The model explains 36.4% of the variance (adjusted R^2=.364). Table 83 gives information for the two significant clinical variables, diagnosis of schizophrenia and anxiety (as measured by the DASS Anxiety Scale score), which were the predictor variables retained in the model. All other variables were insignificant and therefore excluded from the model.

Table 83. Regression Coefficients for Maternal Schizophrenia and DASS Anxiety scores.

Variable	**B**	**SE B**	**β**	**Sig. (*p*)**
Schizophrenia	-3.88	1.31	-.36	.005
Anxiety	-.36	0.08	-.51	<.001

With INCAS Instrumental Domain score entered as the criterion variable, a significant model emerged: $F(1, 44) = 11.85$, $p=.001$. The model explains 19.4% of the variance (adjusted R^2=.194). Table 84 gives information for maternal diagnosis of schizophrenia, which was the predictor variable retained in the model. All other variables were insignificant and therefore excluded from the model.

Table 84. Regression Coefficients for Maternal Schizophrenia.

Variable	**B**	**SE B**	**β**	**Sig. (*p*)**
Schizophrenia	-3.90	1.13	-.46	.001

After analysing the significance of clinical variables on the whole study sample, further analyses were completed to investigate the effects of schizophrenia-specific symptomatology upon early caregiving in schizophrenia. The effects of psychotic symptoms, depression, and antipsychotic medication dosage were investigated through use of correlations and regression analyses. Dimension-level correlations are displayed in Appendix 25.

The Positive and Negative Syndrome Scales for Schizophrenia (PANSS) (Kay et al., 1987) were used to measure positive and negative symptomatology within the schizophrenia group. Overall, psychotic symptoms tended to relate negatively with INCAS Total, Emotional and Instrumental Domain scores (Table 85). This was especially the case for the positive symptoms of Grandiosity and Hostility and the Negative symptoms of Emotional Withdrawal, Lack of Spontaneity and Conversational Flow, and Stereotyped Thinking. There were also strong correlations between INCAS scores and Negative Symptom Totals. Due to very small numbers (n=13), none of these correlations reached statistical significance.

Table 85.Correlation (r) between the INCAS and the PANSS in the schizophrenia group

	INCAS Score		
	Emotional (n=13)	Instrumental (n=13)	Total (n=13)
	Positive symptoms		
Delusions	-.18	-.25	-.22
Conceptual disorganisation	.011	-.33	-.15
Hallucinatory Behaviour	-.11	-.24	-.18
Excitement	.06	-.02	.03
Grandiosity	-.51	-.33	-.46
Suspiciousness/ Persecution	-.21	-.03	-.14
Hostility	-.41	-.50	-.48
Positive Symptom Total	**-.22**	**-.29**	**-.26**
	Negative symptoms		
Blunted Affect	-.25	-.01	-.15
Emotional Withdrawal	-.38	-.38	-.41
Poor Rapport	-.17	-.18	-.19
Passive/ Apathetic Social Withdrawal	.14	.29	.22
Difficulty in Abstract Thinking	-.20	-.33	-.28
Lack of Spontaneity and Conversational Flow	-.52	-.13	-.38
Stereotyped Thinking	-.45	-.43	-.47
Negative Symptom Total	**-.45**	**-.30**	**-.41**

**p< .01; *p< .05 (2-tailed)

The Calgary Depression Scale for Schizophrenia (CDSS) (Addington et al., 1992) has the advantage of measuring depressive symptomatology in schizophrenia without conflating depression with negative symptomatology. There were no significant correlations between the INCAS and depressive symptoms in the schizophrenia group, as measured by the CDSS (Table 86), however overall, depression ratings in the mothers with schizophrenia were low.

Table 86. Correlation (r) between the INCAS and the CDSS in the schizophrenia group

	Emotional domain (n=13)	Instrumental Domain (n=13)	INCAS Total (n=13)
Depression	-.11	-.22	-.17
Hopelessness	.49	.38	.46
Self Depreciation	-.19	-.28	-.24
Guilty Ideas of Reference	-.32	-.38	-.37
Pathological Guilt	-.21	.07	-.09
Morning Depression	-.32	-.28	-.32
Early Wakening	.18	.16	.18
Suicide	-.49	-.49	-.52
Observed Depression	.11	.16	.14
CDSS Total	-.22	-.21	-.23

$^{**}p < .01$; $^{*}p < .05$ (2-tailed)

There were no significant associations between antipsychotic medication dose, as indicated by Chlorpromazine Equivalence, with INCAS scores (Table 87).

Table 87. Correlation (r) between the INCAS and Chlorpromazine Equivalence in the schizophrenia group

	Emotional Domain (n=13)	Instrumental Domain (n=13)	INCAS Total (n=13)
Cpz Eq.	.15	.23	.19

$^{**}p < .01$; $^{*}p < .05$ (2-tailed)

At the level of dimensions, there were no significant correlations between Chlorpromazine Equivalence and early infant caregiving capacity as measured by the INCAS.

As with the regressions completed on the whole study sample, the potentially confounding variables of parity and culture were held constant for regressions conducted on data from the schizophrenia group only. For INCAS Total and Domain scores, a regression analysis was performed with PANSS Positive and Negative Syndrome Scale scores, depression (measured by the Calgary Depression Scale for Schizophrenia; CDSS), and antipsychotic medication levels (indexed by Chlorpromazine equivalence scores) entered as independent (predictor) variables, and the relevant INCAS score as the criterion variable.

Unlike the regressions incorporating the whole study sample, it was found here that none of the schizophrenia-specific independent variables was significant in predicting variation in INCAS Total, Emotional Domain or Instrumental Domain scores.

Table 88. Predictor Variables Entered into the Regression involving the schizophrenia group

Variable	Index
Positive Symptoms	PANSS Positive Symptom Scale Total
Negative Symptoms	PANSS Negative Symptom Scale Total
Depression	CDSS Total
Medication*	Chlorpromazine Equivalent
Parity	Birth order of study infant
Culture	(East Asian/Caucasian)

*due to the potential for maternal response style to confound medication side-effect ratings (demonstrated by varying red-herring scale scores), Cpz equivalence was used as an objective proxy of antipsychotic medication and its side-effects.

Taken together, the results suggest that, across the whole study sample, a diagnosis of schizophrenia in mothers contributes to lower quality Total, Emotional and Instrumental infant caregiving during the postpartum period (as indexed by the INCAS Total, Emotional and Instrumental Domain scores). It was also found that anxiety during the postpartum period exerted a negative impact on INCAS Total and Emotional caregiving scores. Regressions conducted with the schizophrenia group indicated that while a diagnosis of schizophrenia may account for their poorer caregiving capacity relative to the other study groups, something beyond symptomatology or medication is responsible for this deficit.

Relationship of Individual Neurocognitive Variables to Early Infant Caregiving Capacity

The contribution of cognitive deficits was next examined in detail, first at the level of individual cognitive variables, and then with condensed Neurocognitive and Social Cognition indices.

Neurocognition

At the INCAS Total and Domain score level, it was found that WebNeuro Response Speed correlated significantly to INCAS Total (r =.31, n = 47, p =.034) and Instrumental Domain (r =.37 , n = 48, p =.009) caregiving scores (Table 89). Dimension-level correlations are displayed in Appendix 27.

Table 89. Correlations (r) between the INCAS and WebNeuro Composite Scores

WebNeuro Domain	Emotional Domain (n =47)	Instrumental Domain (n =48)	INCAS Total (n=47)
Response speed	.24	.37**	.31*
Impulsivity	.23	.28	.28
Attention	.25	-.06	.15
Information Processing	.20	.19	.25
Memory	.19	.26	.28
Executive Functioning	.20	.16	.21
Emotion Reaction Time	.02	.28	.13
Emotion bias	-.12	.12	-.04

**p< .01; *p< .05 (2-tailed)

Following correlations, regression analyses were performed in order to further examine the relationship between WebNeuro neurocognitive variables and INCAS Total, Domain and Dimension level scores. For each of the INCAS variables, regression equations contained all previously significant clinical variables as predictors. In this way, relationships between INCAS and cognitive variables could be viewed with confounding clinical and sociodemographic variables held constant.

Where significant clinical and sociodemographic confounders were held constant, WebNeuro composite scores were not found to account for a significant proportion of the variance in INCAS Total, Emotional or Instrumental Domain scores.

Executive Functioning

Although executive functioning requires a range of neurocognitive abilities including working memory (scored above), the Wisconsin Card Sort Test is a well-recognised measure and is used across studies to compare functioning in this domain. The relationship of executive functioning to early infant caregiving capacity was first examined in terms of correlations. At the Total and Domain level, no significant correlations were observed between INCAS and WCST scores (Table 90). Dimension-level correlations are displayed in Appendix 27.

Table 90. Correlations (r) between INCAS and WCST Scores

WCST Domain	Emotional Domain (n=42)	Instrumental Domain (n=43)	INCAS Total (n=42)
Total errors	-.12	-.10	-.14
Perseverative responses	-.07	-.04	-.08
Perseverative errors	-.07	-.03	-.07
Nonperseverative errors	-.18	-.17	-.21
% conceptual lvl. responses	.08	.07	.10

***p*< .01; **p*< .05 (2-tailed)

Regression with clinical variables, parity and culture held constant

At the Total and Domain score level, frontal lobe functioning as indexed by WCST scores did not appear to account for a significant proportion of the variance in INCAS Total, Emotional or Instrumental Domain scores.

Creating a Single Variable for Neurocognition

To reduce the number of variables for this relatively small sample, a single Neurocognition variable was created through factor analysis. WebNeuro Response Speed, Impulsivity, Attention, Information Processing, Memory, and Executive Functioning composite scores were entered into the analysis. In line with prior research, 'Percent Conceptual Level Responses' from the Wisconsin Card Sort Test was included as an index of executive function (Bell, 2009; Heaton et al., 1993). Additionally, WCST 'Perseverative Error' scores were incorporated due to their significance in the schizophrenia-specific cognitive deficit (Iampietro, Giovannetti, Drabick, & Kessler, 2012; Ortuno, Arbizu, Soutullo, & Bonelli, 2009; Prentice et al., 2008; Waford & Lewine, 2010).

The data were analysed by means of a principal component analysis. Items were examined in terms of their individual loadings onto a latent 'neurocognition' construct. Results are shown in Table 91.

Table 91. Principal Component Matrix

	Component 1
Response Speed	.925
Impulsivity	.582
Attention	.609
Information Processing	.747
Memory	.627
Executive Functioning	.605
Perseverative Error	.913
Conceptual level Responses	.935

All items had loadings of .582 or higher. For these items, within the current sample, 37.44% of the variance was explained by the largest scale component.

Next, an anti-image correlation matrix was examined to evaluate the individual Kaiser-Meyer-Olkin (KMO) values for each neurocognitive variable. Results are summarised in Table 92. Individual item residual values ranged between .236 and .773, indicating that not all items met criteria for inclusion within the scale. Items with KMO values below .5 (indicated with an asterisk) were omitted from the scale (Brace, 2009).

Table 92. Kaiser-Meyer-Olkin (KMO) Values of Neurocognitive Variables

	KMO
Response Speed	.236*
Impulsivity	.770
Attention	.718
Information Processing	.726
Memory	.773
Executive Functioning	.734
Perseverative Error	.478*
Conceptual level Responses	.486*

The analysis was repeated with the remaining neurocognitive variables. Individual loadings are displayed in Table 93.

Table 93. Principal Component Matrix with Remaining Neurocognitive Variables

	Component 1
Impulsivity	.530
Attention	.531
Information Processing	.680
Memory	.596
Executive Functioning	.571

All items had loadings of .530 or higher. For these items, within the current sample, 58.16% of the variance was explained by the largest scale component.

An anti-image correlation matrix was then examined to evaluate the individual KMO value of each neurocognitive variable. Results are summarised in Table 94. Here, Individual item residual values had improved, ranging from between .805 and .853. All items appeared to meet criteria for inclusion within the scale.

Table 94. Kaiser-Meyer-Olkin (KMO) Values of Remaining Neurocognitive Variables

	KMO
Impulsivity	.806
Attention	.823
Information Processing	.805
Memory	.853
Executive Functioning	.851

Bartlett's Test of Sphericity indicates that the data are factorable (p<.001). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy showed a mean value of .826, indicating that the items have good factorability (Appendix 28).

The components analysis revealed just one factor with an eigenvalue of 1 or greater. Here, 55.16% of the variance was explained by Component 1, and therefore by the solution. As there was only one component extracted, rotation was not required. Factor loadings are displayed in Table 95.

Table 95. One Factor Solution for Neurocognition

	Component 1
Information Processing	.825
Memory	.772
Executive Functioning	.755
Attention	.729
Impulsivity	.728

Figure 23 shows the ordered eigenvalues of each component, with the included component falling above the dotted line.

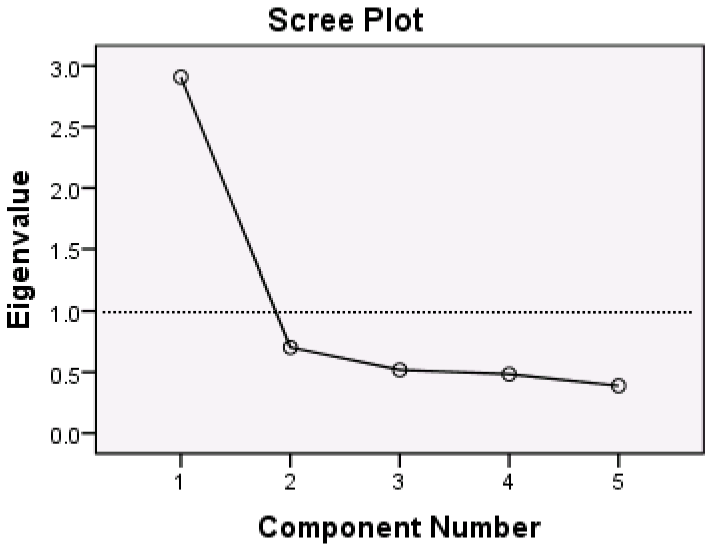


Figure 23. Component eigenvalues.

Taken together, the various indicators of factorability were favourable, with the residuals indicating a good solution. One component with an eigenvalue of greater than 1.0 was identified; the scree plot also indicated one component. The component can be thought of as representing a single exogenous neurocognitive variable.

Internal consistency of items was next examined using Cronbach's alpha coefficient (Cronbach, 1951). Results from the analysis are displayed in Table 96.

Table 96. Cronbach's Alpha Values of Neurocognition Items

Item	Scale variance if item deleted	Item-Total Correlation	Squared Multiple Correlation (R^2)	Cronbach's Alpha if item deleted
Information Processing	12.46	.69	.49	.76
Memory	10.62	.62	.39	.76
Executive Functioning	10.95	.60	.37	.77
Attention	10.48	.57	.36	.78
Impulsivity	12.26	.55	.37	.78

The internal consistency of the neurocognitive variable (computed by summation of component item *z*-scores) was found to be good (α=.82, based on standardised items). All items correlated well with the total variable and enhanced the overall reliability of the variable when included in the solution.

Neurocognition scores across the study groups are summarised in Table 97. There was a significant main effect of study group on Neurocognition scores ($F(2, 46) = 6.23$, $p = .004$). A post-hoc test indicated significantly lower neurocognitive scores in the schizophrenia group compared to healthy controls ($p=.003$). There were no other significant between-group differences in Neurocognition. This adds support to the first cognitive hypothesis in which it is purported that there is a cognitive deficit associated with a diagnosis of schizophrenia.

Table 97. Combined Neurocognition Scores across Study Groups

	Schizophrenia (n=13)		Clinical Control (n =11)		Healthy Control (n =25)		*Sig. (p)*
Neurocognition	-4.10	(5.90)	-1.06	(3.29)	.40	(2.17)	.004

Table 98 summarises the correlations between Neurocognition and INCAS Total, Emotional and Instrumental Domain scores. Pearson product-moment correlations indicated a significant positive relationship between INCAS Total scores and Neurocognition ($r = .30$, $n = 48$, $p = .04$).

Table 98. Relationship (r) between the INCAS, Neurocognition, and Social Cognition

	INCAS (n=48)		
	Emotional	Instrumental	Total
Neurocognition	.28	.20	.30*

At the Total and Domain score level, Neurocognition as indexed by a single score did not appear to account for a significant proportion of the variance in INCAS Total, Emotional or Instrumental Domain scores.

Regressions were then conducted with the schizophrenia group only to determine whether there is a relationship between neurocognition and early caregiving capacity specific to the maternal diagnosis. Again, however, the Neurocognitive variable was not found to significantly account for variance in INCAS Total, Emotional or Instrumental Domain scores.

Taken together, these results show that neurocognition (as indexed by the condensed Neurocognition variable) and maternal processing speed were related to aspects of early infant care. However, these relationships lost significance when anxiety and maternal schizophrenia were controlled for within regression analyses, suggesting that there is not a direct relationship between neurocognition and early infant caregiving capacity, or alternatively, that the relationship is only slight.

Relationship of Social Cognition to Early Infant Caregiving Capacity

Facial affect recognition, theory of mind, and empathy were examined for significance as predictors of early caregiving capacity. Data reduction was then used to create a single Social Cognition variable, which was also evaluated for significance.

Facial affect recognition was indexed by WebNeuro Emotion Identification subtask scores. The relationship of this social cognition with early parenting capacity was first examined at the correlational level, then using regressions with other confounders held constant. To adjust for multiple comparisons, significance was set at $p \leq .01$.

Practical caregiving (ie; INCAS Instrumental domain scores) was positively associated with memory for angry facial affect (RT: $r = .41$, $n = 44$, $p = .006$) and also with the ability to recognise fearful facial affect (% accuracy: $r = .38$, $n = 44$, $p = .010$). There were no significant correlations between INCAS Emotional Domain or Total scores and WebNeuro facial affect recognition scores. Correlations are displayed in Table 99. Dimension-level correlations can be viewed in Appendix 27.

Table 99. Correlations (r) between INCAS Scores and WN Emotion Processing Scores

WN Emotion Identification Item	Emotional Domain (n=43)	Instrumental Domain (n=44)	INCAS Total (n=43)
Emotion memory			
Fear %	-.14	-.04	-.10
Fear RT	.08	.22	.16
Angry %	.23	.38	.33
Angry RT	.27	.41*	.36
Disgust %	-.13	.00	-.08
Disgust RT	.28	.36	.36
Sad %	-.18	.00	-.11
Sad RT	.20	.25	.24
Happy %	-.13	.00	-.08
Happy RT	.23	.34	.31
Neutral %	-.14	.10	-.03
Neutral RT	-.11	.19	.02
Emotion Recognition			
Fear %	.22	.38*	.31
Fear RT	.14	.34	.20
Angry %	.00	.14	.03
Angry RT	-.04	.24	.07
Disgust %	.28	.26	.29
Disgust RT	-.11	.07	-.03
Sad %	.16	.26	.23
Sad RT	-.06	.20	.03
Happy %	-.05	-.07	-.06
Happy RT	.22	.23	.28
Neutral %	.01	.24	.14
Neutral RT	.05	.22	.14

*$p \leq .0\ 1$ (2-tailed); RT= Reaction Time; % = percent accuracy.

When facial affect items were examined for significance as predictors of parenting capacity, clinical variables, parity and culture were held constant while each INCAS score was examined as the criterion variable.

At the Total and Domain score level, INCAS Total scores were in part accounted for by memory for angry and neutral facial affect. INCAS Instrumental Domain scores were accounted for in part by the ability to recognise fearful facial affect and memory for angry facial affect. Facial affect recognition scores did not contribute significantly to variance in

INCAS Emotional Domain scores. Results from the regression analyses are summarised below.

Using the stepwise method, a significant model produced when INCAS Total score was entered as the criterion variable: $F(4, 34) = 11.77$, $p<.001$. The model explains 53.1% of the variance (adjusted $R^2=.531$). Table 100 gives information for the significant predictors retained in the model, including maternal schizophrenia, anxiety (as measured by DASS Anxiety Scale scores), together with WebNeuro facial affect recognition scores for angry and neutral facial affect memory.

Table 100. Regression Coefficients for Maternal Schizophrenia, DASS Anxiety, and WN Emotion Identification

Variable	**B**	**SE B**	**β**	**Sig. (*p*)**
Schizophrenia	-9.48	2.28	-.48	<.001
Anxiety	-.47	.13	-.42	.001
Emotion Memory				
Angry: accuracy	3.28	.90	.50	.001
Neutral: accuracy	-2.97	1.02	-.40	.006

A significant model was also produced when INCAS Instrumental Domain total was entered as the criterion variable: $F(3,40) = 12.28$, $p<.001$. The model explains 44% of the variance (adjusted $R^2=.440$). Table 101 gives information for maternal schizophrenia, fear recognition and memory for angry facial affect (as indexed by the WebNeuro Facial Affect Recognition task). Aside from these items, no other predictor items were significant, and were thus excluded from the model.

Table 101. Regression Coefficients for Maternal Schizophrenia and WN Emotion Identification

Variable	**B**	**SE B**	**β**	**Sig. (*p*)**
Schizophrenia	-4.57	1.10	-.49	<.001
Emotion Recognition				
Fear: accuracy	1.18	.53	.26	.031
Emotion Memory				
Anger: reaction time	.88	.40	.26	.034

Maternal empathy was measured with the Interpersonal Reactivity Index (Davis, 1980, 1983), which contains Empathic concern, Perspective-taking, Personal distress and Fantasy sub-scales.

While there were no significant correlations between empathy variables and INCAS Total, Emotional or Instrumental Domain scores, there were some relationships at the dimension level. Results are summarised in Table 102 below. Dimension-level correlations are displayed in Appendix 27.

Table 102. Correlations (r) between INCAS and IRI Scores

IRI Domain	Emotional Domain (n=47)	Instrumental Domain (n=48)	INCAS Total (n=47)
Empathic concern	.17	.25	.24
Perspective taking	.23	.24	.28
Personal distress	-.08	-.12	-.10
Fantasy Scale	.05	.09	.09

***p*< .01; **p*< .05 (2-tailed)

After examining correlations, the relationship between early infant caregiving capacity and empathy were examined more closely with the use of regression analyses. With significant clinical variables held constant, empathy was examined for significance as a predictor of each of the INCAS scores (i.e. Total, Domain and Dimension scores).

There was no significant contribution of empathy, as indexed by the Interpersonal Reactivity Index, to variance in INCAS Total or Domain scores.

Theory of mind was measured in terms of the ability to attribute intention to others with the Comic Strip Task (Sarfati, 2003) and the ability to understand the meaning of spoken hints with the Hinting Task (Corcoran, 1995).

The relationship between theory of mind and infant caregiving capacity was first examined at the level of correlations, followed by regressions with significant clinical variables held constant.

The mothers' ability to correctly attribute intentions to others, as required by the comic strip task, was highly related to her infant caregiving capacity and, in particular, her emotional caregiving capacities. Correlations are displayed in Table 103, below. At the Total and Domain score level, theory of mind scores correlated significantly with INCAS Total (r = .33, n =47, p =.021) and Emotional Domain (r = .40, n =47, p =.005) scores, suggesting that higher caregiving capacity is associated with greater ability to conceptualise other minds and infer their intentions. Dimension-level correlations are displayed in Appendix 27.

Table 103. Correlations (r) between INCAS and AIO Scores

	Emotional Domain (n=47)	Instrumental Domain (n=48)	INCAS Total (n=47)
AIO score	.40**	.18	.33*

**p< .01; *p< .05 (2-tailed)

When regressed onto INCAS scores with significant clinical variables held constant, there was no significant contribution of AIO scores to variance in INCAS Total, Emotional or Instrumental domain scores.

The ability to understand what is meant by the spoken hints of others was observed to relate strongly to early infant caregiving capacity, particularly with respect to emotional aspects of caregiving. As with the AIO, the Hinting Task correlated significantly with INCAS Total (r = .38, n =46, p =.009) and Emotional Domain scores (r = .41, n =46, p =.004). There were no other significant correlations. These findings suggest that where mothers were proficient at understanding the verbal hinting of others (as indicated by high Hinting Task scores), they were also proficient in their delivery of emotional infant care. Correlations are shown in Table 104 below. Dimension-level correlations are displayed in Appendix 27.

Table 104. Correlations (r) between INCAS and Hinting Task Scores

HT Score	Emotional Domain (n=46)	Instrumental Domain (n=47)	INCAS Total (n=46)
	.41**	.21	.38**

**p< .01; *p< .05 (2-tailed)

The relationship between caregiving capacity and theory of mind with respect to the ability to understand hinting (i.e. 'reading between the lines') was further examined using regression. When significant clinical variables were held constant, Hinting Task scores were not found to contribute significantly to variance in INCAS Total, Emotional or Instrumental domain scores.

Attributional style was measured using the Internal, Personal and Situational Attributions Questionnaire (IPSAQ)(Kinderman & Bentall, 1996), which generated subscale scores to show individual differences in positive and negative event attributional style, together with the extent to which attributional biases exist.

Overall, INCAS Total (r = .31, n =45, p =.037) and Instrumental Domain scores (r = .29, n =46, p =.047) were significantly related to a tendency in the mother towards attributing events to external (rather than internal) causes (Table 105). Although not significant, an externalising attributional style was also related to higher Emotional Domain scores. Dimension-level correlations are displayed in Appendix 27.

Table 105. Correlations (r) between INCAS and IPSAQ Scores

IPSAQ items	Emotional Domain (n=45)	Instrumental Domain (n=46)	INCAS Total (n=45)
Positive events			
Internal	.08	.04	.05
External, Personal	.02	.05	.05
External, Situational	-.11	-.06	-.11
Negative events			
Internal	-.16	-.22	-.23
External, Personal	.18	.20	.21
External, Situational	-.03	.05	.01
Attributional Bias			
Externalising Bias	.25	.29*	.31*
Personalising Bias	.11	.10	.12

$^{**}p < .01$; $^{*}p < .05$ (2-tailed)

To examine the relationship with significant clinical variables held constant, regression analyses were performed. Differences in attributional Externalising Bias were found to contribute significantly to differences in INCAS Total scores. Specifically, there was a significant positive impact of self-serving bias (the tendency to blame the self less for negative events than for positive events) upon the quality of early caregiving capacity, as measured by INCAS Total scores. Attributional style was not found to contribute significantly to models with INCAS Emotional or Instrumental Domain scores as the criterion variable. Results from the regression analyses are summarised below.

Using the stepwise method, a significant model was produced when INCAS Total was entered as the criterion variable: $F(3,37) = 9.75$, $p<.001$. The model explains 44.1% of the variance (adjusted $R^2=.441$). Table 106 gives information for maternal schizophrenia, anxiety (as measured by DASS Anxiety Scale scores), and Externalising Bias (as measured by the IPSAQ). Aside from these items, no other predictor items were significant, and were thus excluded from the model.

Table 106. Regression Coefficients for Maternal Schizophrenia, DASS Anxiety, and Externalising Bias scores

Variable	**B**	**SE B**	**β**	**Sig. (*p*)**
Schizophrenia	-8.24	2.23	-.46	.001
Anxiety	-.40	.14	-.36	.006
Externalising Bias	.55	.27	.25	.047

To reduce variables for this small study, a single Social Cognition variable was created through factor analysis. Indices of social cognition within the study measured: 1) facial affect recognition (Webneuro Emotion Recognition scores); 2) theory of mind (Cartoon Task (AIO) scores; Hinting Task (HT) scores); and 3) empathy (Interpersonal Reactivity Index (IRI) Perspective Taking, Empathic Concern, Personal Distress and Fantasy scales). These item scores were submitted to a principal components analysis with varimax rotation in order to assess whether a single social cognition score could be generated. Items were firstly examined in terms of their individual loadings onto a latent 'social cognition' construct. Results are shown in Table 107.

Table 107. Principal Component Matrix

	Component 1
WebNeuro Facial Affect Recognition	
Fear	.708
Sad	.701
Happy	.712
Neutral	.696
Disgust	.709
Empathy Scales	
Perspective Taking	.735
Empathic Concern	.750
Personal Distress	.750
Fantasy Scale	.853
Attributional Style	
Personalising Bias	.407
Externalising Bias	.662
Theory of Mind	
AIO Total	.768
Hinting Task Total	.761

All items had loadings of .407 or higher. For these items, within the current sample, 17.91% of the variance was explained by the largest scale component. The individual Kaiser-Meyer-Olkin (KMO) value of each variable was then examined within an anti-image correlation matrix. Results are summarised in Table 108 below. Individual item residual values ranged between .310 and .607, indicating that not all items met criteria for inclusion within the scale. Items with KMO values below .5 (indicated with an asterisk) were omitted from the scale (Brace, 2009).

Table 108. Individual KMO Values of Social Cognition Variables

	KMO Value
WebNeuro Facial Affect Recognition	
Fear	.391*
Sad	.575
Happy	.370*
Neutral	.397*
Disgust	.412*
Empathy Scales	
Perspective Taking	.474*
Empathic Concern	.497*
Personal Distress	.365*
Fantasy Scale	.384*
Attributional Style	
Personalising Bias	.457*
Externalising Bias	.464*
Theory of Mind	
AIO Total	.571
Hinting Task Total	.607

The analysis was repeated with the remaining social cognition variables. Individual loadings are displayed in Table 109.

Table 109. Principal Component Matrix with Remaining Social Cognition Variables

	Component 1
Sad Facial Affect Recognition	.388
AIO Total	.717
Hinting Task Total	.745

Items had loadings of .388 or higher. For these items, within the current sample, 61.67% of the variance was explained by the largest scale component. An anti-image correlation matrix was then examined to evaluate the individual KMO value of each social cognition variable. Results are summarised in Table 110 below. Here, individual item residual values were better, ranging between .566 and .786. All items appeared to meet criteria for inclusion within the scale.

Table 110. KMO Values of Remaining Social Cognition Variables

	KMO
Sad Facial Affect Recognition	.786
AIO Total	.571
Hinting Task Total	.566

Bartlett's Test of Sphericity indicates that the data are factorable (p<.001) (Appendix 29). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy showed a mean value of .596, indicating that the items have adequate factorability.

The components analysis revealed just one factor with an eigenvalue of 1 or greater. Here, 61.67% of the variance was explained by Component 1, and therefore by the solution. As only one component was extracted, rotation was not required. Factor loadings are displayed in Table 111.

Table 111. One Factor Solution for Social Cognition

	Component 1
Sad Facial Affect Recognition	.623
AIO Total	.847
Hinting Task Total	.863

Figure 24 shows the ordered eigenvalues of each component, with the included component falling above the dotted line.

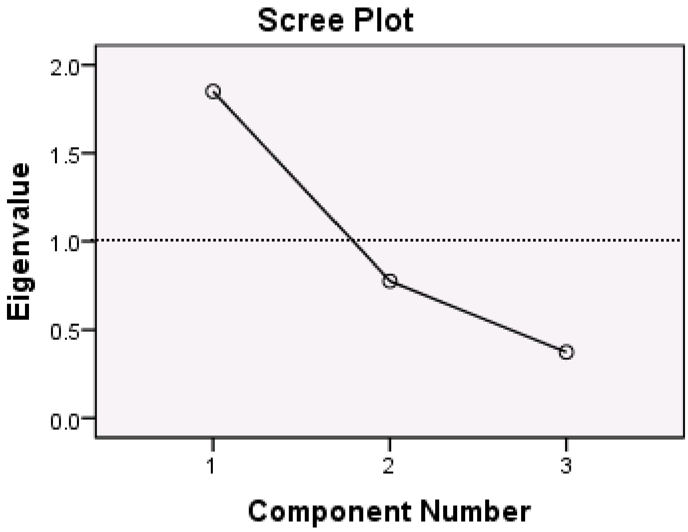


Figure 24. Component eigenvalues.

Taken together, the various indicators of factorability were favourable, with the residuals indicating an adequate solution. One component with an eigenvalue of greater than 1.0 was identified; the scree plot also indicated one component. The component can be thought of as representing a single exogenous Social Cognition variable. Factor scores were summated *z*-scores of the relevant component variables.

Internal consistency of items was examined using Cronbach's alpha coefficient (Cronbach, 1951). Results from the analysis are displayed in Table 112.

Table 112. Cronbach's Alpha Values of Social Cognition Items

Item	Scale variance if item deleted	Item-Total Correlation	Squared Multiple Correlation (R^2)	Cronbach's Alpha if item deleted
Sad Facial Affect Recognition	31.78	.40	.16	.83
AIO Total	10.08	.73	.54	.39
Hinting Task Total	14.67	.74	.54	.33

The internal consistency of the social cognition variable (computed by summation of component items) was found to be satisfactory (α=.71, based on standardised items). All items correlated adequately with the total variable. While the facial affect recognition item appeared to adversely affect the variable's overall reliability, it was retained due to its real-world importance in both caring for an infant and more general social functioning.

Social Cognition scores across the study groups are summarised in Table 100. Mothers in the healthy control group scored higher than mothers in both of the clinical groups. Between the clinical groups, mothers with schizophrenia scored lower than those with affective illnesses. Between-group differences in Social Cognition did not reach statistical significance.

Table 113. Combined Social Cognition across Study Groups

	Schizophrenia (n =7)		Clinical Control (n =10)		Healthy Control (n =24)		*Sig. (p)*
Social cognition	14.57	(11.45)	20.16	(11.93)	26.58	(14.57)	ns

Table 114 summarises the correlation between the single Social Cognition variable and INCAS Total, Emotional and Instrumental Domain scores. A significant positive correlation was found between INCAS Instrumental Domain scores and Social Cognition (r = .32, n = 41, p =.043), as well as between INCAS Total scores and Social Cognition (r =.36, n = 40, p =.024).

Table 114. Relationship (r) between the INCAS and Social Cognition

	INCAS (n=41)		
	Emotional	Instrumental	Total
Social Cognition	.28	.32*	.36*

**p< .01; *p< .05 (2-tailed)

At the Total and Domain score level, Social Cognition as indexed by a single score did not appear to account for a significant proportion of the variance in INCAS Total, Emotional or Instrumental Domain scores.

As there were only seven mothers with schizophrenia who had valid data for the Social Cognition variable, it was not possible to conduct regressions at the single-group level.

Overall, at the level of correlations, many aspects of social cognition related strongly to early infant caregiving capacity as measured by the INCAS. Significant positive relationships were observed between early caregiving and social cognition (as measured by the condensed single variable), facial affect recognition, theory of mind and attributional style. Regarding facial affect recognition, it was seen in particular that higher parenting capacity related strongly to better recognition of negative facial affect. Theory of mind related strongly to INCAS Total and Emotional Domain scores, while Externalising Bias (the tendency to attribute events to causes outside the self) related positively to INCAS Total and Instrumental Domain scores.

When significant clinical variables were held constant within regression analyses, the ability to read and process facial affect and the mother's attributional style retained significance as predictors of early caregiving capacity.

Cognitive Hypothesis 3: Social Cognition as a Mediator between Neurocognition and Caregiving Capacity

In line with the literature regarding schizophrenia-associated cognitive deficit and functional capacity, it was expected in the case of parenting function that a mediation model (where neurocognition affects INCAS scores indirectly via its impact upon social cognition) would prove a good fit for the sample data (Bell, 2009; Addington et al., 2010; Addington et al., 2006; Sergi et al., 2006). The following was hypothesised:

Hypothesis VI) *There will be a mediating effect of social cognition upon the relationship between neurocognition and early caregiving capacity. It will be established through path analysis that neurocognition affects early infant caregiving capacity indirectly, via its influence upon social cognition. Specifically, a mediation model where Neurocognition affects INCAS scores indirectly via its impact upon social cognition (*Figure 26*) will fit better than a basic model where there are direct pathways between each cognitive variable and INCAS scores (*Figure 25*).*

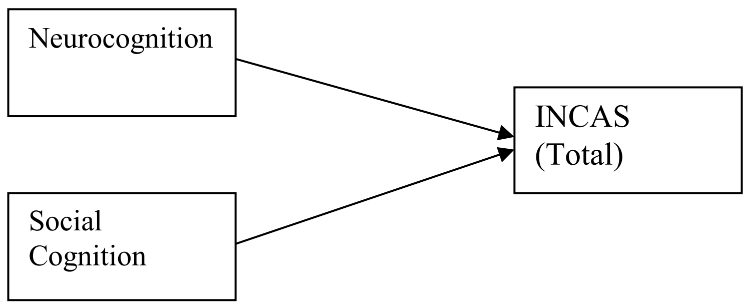


Figure 25. Basic Model

Figure 26. Proposed Mediation Model

The condensed Neurocognition and Social Cognition variables were used to test the final cognitive hypothesis. The means and standard deviations pertaining to INCAS Total scores, Neurocognition and Social Cognition have been reproduced in Table 115.

Table 115. INCAS Total, Social Cognition and Neurocognitive Variables across Study Groups

	Schizophrenia		Clinical Control		Healthy Control		*Sig. (p)*
INCAS Total	21.48	(8.03) (n=13)	30.33	(6.13) (n=12)	30.37	(6.52) (n=25)	.001
Neurocognition	-4.10 (n=13)	(5.90)	-1.06	(3.29) (n =11)	.40	(2.17) (n =25)	.004
Social cognition	14.57	(11.45) (n =7)	20.16	(11.93) (n =10)	26.58	(14.57) (n =24)	ns

The correlational matrices of the variables are shown in Table 116.

Table 116. Relationship (r) between the INCAS, Neurocognition, and Social Cognition

	INCAS Total	Neurocognition	Social Cognition
INCAS Total	1	.30* *p*=.037 (n=48)	.36* *p*=.024 (n=40)
Neurocognition		1	.36* *p*=.022 (n=41)
Social Cognition			1

$^{**}p < .01$; $^{*}p < .05$ (2-tailed)

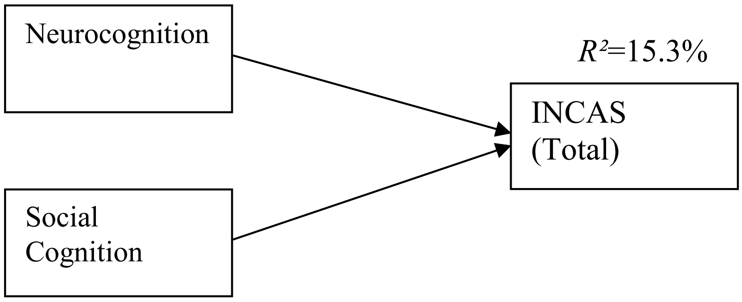
Path analyses were undertaken to test the relationship between neurocognition, social cognition, and early infant caregiving capacity using SPSS Version 21.0 with AMOS Version 7.0 (Arbuckle, 2006). The analyses included the whole study sample (*n*=51). Missing data were handled by estimating means with the Maximum Likelihood procedure. In the first path analysis (the basic model), Neurocognition and Social Cognition were exogenous variables, while INCAS Total scores served as the dependent variable. In the second path analysis (the mediation model), Neurocognition was treated as the exogenous variable, while Social Cognition was treated as the mediating variable.

Three different goodness-of-fit statistics were used, including the model relative chi square (X^2/df) (Wheaton, 1977), the comparative fit index (CFI) (Bentler, 1990) and the root mean square error of approximation (RMSEA) (Steiger, 1990). These fit statistics were selected due to their usefulness in studies with small sample sizes (Hooper, 2008). The CFI compares the proposed model with an independence model, a null model that assumes all variables are unrelated to the dependent variable. A model that fits well with the data has a X^2/df ratio of less than 3 (Kline, 1998), a CFI of greater than 0.90 (Hu, 1999), and an RMSEA less than 0.08 (Browne, 1993).

Findings

Model 1.

The basic model hypothesised that Neurocognition and Social Cognition would each impact significantly upon early caregiving capacity, as measured by INCAS Total scores. The first model showed that together, neurocognition and social cognition explained 15.3% of the variance in caregiving capacity. While the unique contribution of social cognition upon caregiving capacity was significant (p=.031), neurocognition did not exert a significant unique contribution to caregiving capacity scores. On the whole, the model did not fit well with the observed data. Statistics (X^2= 4.681, df=1, p=.031; CFI=1 (saturated model), .447 (default model); and RMSEA = .271) demonstrated that it is not a well-fitted model according to the criteria. Results are shown in Figure 27 and Table 117 below.



Fit Statistics

1. X^2/df=4.681
2. CFI=1 (saturated); .447 (default)
3. RMSEA=.271 (default); .149 (independence)

Figure 27. Path Analysis Model 1: Neurocognition and social cognition as predictors of early infant caregiving capacity as measured by the INCAS.

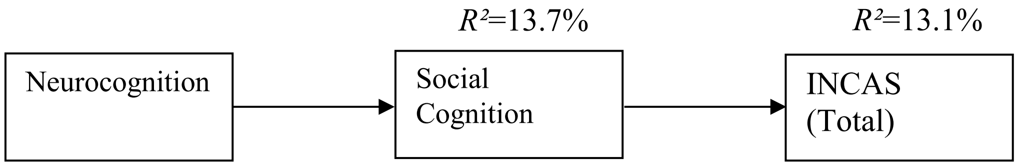
Regression coefficients for Neurocognition and Social cognition are displayed in Table 117.

Table 117. Regression Coefficients for Neurocognition and Social Cognition

Variable	***B***	***SE B***	***β***	***Sig. (p)***
Neurocog. → INCAS	*.44*	*.25*	*.24*	*.080*
Social cog. → INCAS	*.17*	*.08*	*.31*	*.031*

Model 2.

Within the mediation model, it was hypothesised that neurocognition would relate *indirectly* to parenting capacity via its influence upon social cognition. The second model showed that social cognition was the mediator between neurocognition and early infant caregiving capacity. Neurocognition explained 13.7% of the variance in social cognition, which in turn explained 13.1% of the variance in caregiving capacity. According to the X^2/df and CFI statistics, the model fit well with the data (X^2= 2.025, df=1, p=.155; CFI=1 (saturated model), .846 (default model); however an RMSEA value of .143 suggested that the model was not wholly well-fitted according to the recommended criteria. Results are shown in Figure 28 and Table 118 below.



Fit statistics

1. X^2/df=2.025
2. CFI=1 (saturated); .846 (default)
3. RMSEA=.143 (default); .149 (independence)

Figure 28. Path Analysis Model 2: Social cognition as the mediator between Neurocognition and early infant caregiving capacity as measured by the INCAS.

Regression coefficients are displayed in Table 118.

Table 118. Regression Coefficients for Neurocognition and Social Cognition

Variable	**B**	**SE B**	**β**	**Sig. (*p*)**
Neurocog. → Social cog.	1.27	.50	.37	.011
Social cog. → INCAS	.20	.08	.36	.012

The path analyses showed that Model 2 is better than Model 1 in terms of goodness of fit. While not an entirely perfect fit due to a higher than ideal RMSEA value, the mediation model (Model 2) did demonstrate improved fit in comparison to the basic model (Model 1). The mediation model indicated that within this sample of mothers, neurocognition has a significant direct effect upon social cognition, together with a significant indirect effect on early caregiving capacity that is mediated by social cognition. Here it was observed that neurocognition has a positive impact upon social cognition, and a positive indirect impact on infant caregiving capacity via its influence on social cognition. It was also found that social cognition has a positive direct impact on infant caregiving capacity. These findings add support to the overarching cognitive hypothesis that the cognitive deficit associated with schizophrenia has a significant negative impact on early infant caregiving capacity. The findings also help to explain the weaker direct relationship of neurocognition with INCAS scores that was observed in relation to Cognitive Hypothesis 2.

Conclusion

Overall, there was support for each of the cognitive hypotheses. Relative to the Control groups, a cognitive deficit was evident in the schizophrenia group in areas of neurocognition (response speed, impulsivity, information processing, memory and executive functioning) and social cognition (facial affect recognition, theory of mind, and attributional style). Where other significant predictors of infant caregiving were held constant (including a diagnosis of schizophrenia and elevated postpartum anxiety symptoms), it was observed that the social cognitive deficits associated with schizophrenia were significant in predicting a portion of role-related impairment in mothers. It was clarified through path analyses that although not directly causing impairment in caregiving capacity, schizophrenia-associated neurocognitive deficits affect maternal role functioning indirectly, through their deleterious effect upon areas of social cognition.

Chapter 7: Discussion

This study had two main aims: to develop and pilot an instrument to assess early caregiving capacity in mothers with schizophrenia; and to determine the extent to which cognitive deficits contribute to difficulty in caregiving, relative to other clinical variables. In this chapter, the findings are discussed in relation to these aims and the study's significant contributions to knowledge of motherhood and schizophrenia are highlighted. A major limitation within the study at hand was the very small sample size. Within the context of only 51 participants, these findings must be viewed as preliminary. Studies that replicate these findings in larger samples are required.

The Infant Caregiving Assessment Scales (INCAS)

The Infant Caregiving Assessment Scales (INCAS) are the first evidence-based assessment tool for this important parenting group. Until now, a key problem in practice has been the lack of an adequate assessment tool for this high-needs parenting cohort. As a result, decision-making and intervention-planning have been informed by inappropriate assessment and biased clinical impressions. Compared to the existing body of instruments, the INCAS is one of very few tools to incorporate instrumental and emotional aspects of care into one stand-alone assessment. The INCAS is also the only measure to represent caregiving with such a varied, inclusive behavioural sample and as such, is unique as a measure of maternal role *function*. Existing assessments differ from the INCAS as they are primarily measures of *interaction* (see Chapter 4 for review). Broadening assessment to incorporate instrumental functioning facilitates basic-level intervention alongside higher-order relational training.

Where existing mother-infant measures spend little detail on rudimentary aspects of care, the INCAS measures this instrumental component exhaustively. In doing so, it captures variability among the low end of the ability spectrum. Unlike the Nursing Child Assessment Feeding Scale (NCAST-F) (Barnard, 1978), for instance, the INCAS differentiates mothers with schizophrenia from both healthy and mood-disordered controls. The discriminating power of the INCAS in this respect allows fine-grained identification of role-related areas that are affected in relation to schizophrenia. Discovery of detailed areas of difficulty adds to what is so far known about the specific effects of schizophrenia on infant caregiving capacity. This detailed information is a useful start-point in tailoring interventions.

Within the current feasibility pilot, the INCAS was found to be valid and reliable not only for mothers with schizophrenia, but also for those affected by mood disorders and for healthy postpartum controls. Role-related difficulty in this area is not restricted to mothers with schizophrenia. It is therefore significant that the tool's utility extends to other parenting groups who may encounter their own range of difficulties. The INCAS was able to match the judgement of clinicians regarding the ability to deliver infant care. It also demonstrated strong agreement with the Nursing Child Assessment Feeding Scale (NCAST-F) (Barnard, 1978), a gold-standard measure of early emotional caregiving. The INCAS showed convergence with the Mind Mindedness (MM) Procedure (Meins et al., 2002), a measure of the mother's infant-directed social cognition. It related negatively to indicators of parenting difficulty such as the Camberwell Assessment of Need for Mothers (CAN-M) (Howard et al., 2007) and the Parenting Stress Index (PSI) (Abidin, 1995). As well as distinguishing mothers with schizophrenia from groups with affective illness and no psychiatric illness, the INCAS also distinguishes between groups who are involved vs. not involved with child protective services, suggesting its potential value in this setting. On the basis of the small sample that was successfully followed up over 12 months, the INCAS demonstrates predictive validity, with scores accounting for infant development at one year of age (especially regarding *communication* and *cognition*). Postnatal INCAS scores were also predictive of mother-infant attachment security at one year of age, a cornerstone of emotional development (Ainsworth et al., 1978; Ainsworth et al., 1974). The preliminary psychometrics of the INCAS are discussed below.

Psychometric Properties of the INCAS

Internal Consistency

Item selection was driven by findings relating to the tool's internal consistency. Rigorous consideration of prospective scale items helped to reduce and focus the INCAS. Additionally, culling the incompatible items helped to balance the two INCAS domains. The best internal consistency was achieved through deleting *attributional style*, *precision*, *planning* and *maternal self-efficacy*. It is likely that these items did not fit with the scale due to inadequate measurement of the sub-constructs. *Attributional style* likely quantified the propensity for self-blame, viewed in Leventhal's theory of self-regulation as a maladaptive coping procedure (Leventhal, Diefenbach, & Leventhal, 1992). It is also probable that *precision* and *planning* did not accurately measure these parts of role functioning, instead capturing the behavioural correlates of neuroticism. Previous research (Clark, Kochanska, & Ready, 2000; Kendler, Sham, & MacLean, 1997; Kochanska, Clark, & Goldman, 1997) demonstrated convincing links between neuroticism and child-directed negative affectivity, low responsivity, higher physical and verbal power assertion and lower encouragement of autonomy (reviewed in McCabe, 2014).

While it was expected that high *maternal self-efficacy* would contribute to positive overall parenting in the context of early infant care, this item did not fit well within the scale. This may be explained by the identified link between undue parenting confidence (i.e. confidence in the absence of adequate ability) and lower sensitivity to the infant. Within the current sample, it was often the case that mothers seemed highly confident (i.e. scoring high on *maternal self-efficacy*) while having poor overall ability (evidenced by low scores on other dimensions). This combination of high maternal self-efficacy with low parenting ability is referred to as *illusory control*, and has been linked to an increase in maternal susceptibility to learned helplessness, over-controlling and interfering parenting practices, and lower emotional sensitivity (Donovan, Taylor & Leavitt, 2007; Donovan, Leavitt & Walsh, 1990, 2000). With the above items deleted, the INCAS had 12 remaining dimensions. These were then examined for factorability into scale domains.

Components Analysis

A components analysis of the 12-item INCAS revealed a two-factor structure within the scale. As put forth in hypothesis II, the two-factor solution was found to converge with the literature delineating practical and emotional aspects of infant care (reviewed in Chapter 2). Regarding hypothesis I, both components and all items were found to load significantly onto one caregiving construct, indicating retention within the scale.

There were some unexpected findings during factor analysis that warrant discussion. While it was expected that a*daptability* would fall under the instrumental domain, factor analysis demonstrated its stronger relationship to the emotional items, suggesting that it involves more than practical skill. Willingness to accommodate the infant, an emotional element, is also required for a good score on this dimension. *Knowledge* around how to accommodate unexpected needs is not sufficient of itself for a high rating. To score on this dimension, the mother needs to have *chosen* to deviate from her plan, usually putting herself out to some extent. A child-centred, adaptable approach to caregiving therefore arises from a mother's emotional connection to her infant coupled with her emotional intelligence, which she uses to sense the independent inclinations of her child. Results of the factor analysis suggest that these emotional underpinnings are significant in caregiving *adaptability*.

Interestingly, while it was expected that *diligence* would be an emotional dimension, it loaded more strongly onto the instrumental domain. This suggests that conscientiousness during caregiving may reflect an implicitly held tendency toward thoroughness, rather than an emotional willingness to exert effort. *Mindedness* loaded quite heavily (>.4) onto both of the caregiving domains, indicating that, while largely an emotionally-based capacity, it also contains a procedural element that draws on instrumental capacities. This was exemplified by the strong correlation between instrumental domain scores and the Mind-Mindedness item - '*number of appropriate infant-directed mental state comments*' (Meins et al., 2002). It seems likely that within the INCAS, *mindedness* is a multi-facetted construct that may be better measured by more than one dimension. Its status in the instrument would have to be reviewed in light of testing with more mothers.

While it is possible that *mindedness* may not survive a larger analysis, it has for now been retained due to its potential importance in infant development, as highlighted within the literature and the study at hand. Within the current sample, the mother's postnatal *mindedness* score related strongly to the one-year infant outcomes of *cognition* and *receptive communication*, as measured by the BSID-III (Bayley, 2006). It also correlated to a moderate degree with twelve month BSID-III *expressive communication* and *fine motor* scores. Regarding emotional development, *mindedness* linked strongly to security of mother-infant attachment at one year. It was therefore considered an important item in the scale.

Reliability

In line with hypothesis III, internal consistency of the final 2-factor solution was strong, with high alpha values for Domain and Total scores and strong item-total correlations for the dimensions. Regarding hypotheses IV and V, the tool exhibited strong inter-rater reliability and stability over time between repeat administrations. Due to unforeseen issues relating to the availability of mothers, the stability of the INCAS was often tested over longer lapses than originally intended (range: 1 - 64 days; average: 20 days; median: 9 days). The stability of scores over such long periods of time suggests not only that the INCAS is reliable in this respect, but also that mothers seem to fall into a stable pattern of caregiving quite early on in the relationship. This replicates the original findings of Ainsworth and colleagues by demonstrating that there are relational patterns established early on which remain stable over time (Ainsworth et al., 1978; Ainsworth, 1985). There are few tools available for mothers of infants under a year of age, so evidence supporting the viability of measuring parenting this early on with reliability is significant for the schizophrenia cohort, where early assessment is required.

Construct Validity

The INCAS demonstrated a sound ability to estimate the judgement of specialist perinatal clinicians, indicating good face validity. Additionally, the INCAS related strongly to the concurrently administered NCAST-F (Barnard, 1978), a gold-standard measure of caregiving interaction. There was also strong agreement between the INCAS and the Mind-Mindedness procedure (Meins et al., 2002), a measure of the mother's emotional availability to and psychological understanding of her infant (hypothesis VIII). As predicted in hypothesis VII, there were negative correlations between the INCAS and the Camberwell Assessment of Need for Mothers (CAN-M) (Howard et al., 2007). Mothers with higher support needs regarding their maternal role functioning scored lower on the INCAS. It is important that high levels of parenting-related need are detected and highlighted during assessment with the INCAS due to the negative consequences of these needs remaining unmet (Howard et al., 2003).

In line with expectations put forth in hypothesis VI, the INCAS also related negatively to parenting stress as measured by the PSI. There were larger correlations with PSI Child Domain scores, suggesting that the INCAS (and the mother's early caregiving capacity) relates most strongly to maternal stress where that stress relates directly to the infant. Notably, it was found that within the PSI Child Domain, Acceptability (i.e. how acceptable the mother found her infant) related to INCAS Total, Emotional, and Instrumental Domain scores, setting it apart as an important area of parenting-related stress in early infant caregiving. This could tell us something about stress and caregiving in general, in that the more specific the mother's stress content is to her child, the more effect it has upon her capacity to adequately care for that child. It could also be that lower parenting capacity creates a higher level of stress in relation to the child.

In the current study it was observed that mothers with schizophrenia tended to find their infants the least acceptable of all parenting groups. A diagnosis of schizophrenia was also associated with the infant being less responsive to the mother during feeding. This replicates previous research regarding maternal schizophrenia and caregiving, where infants were observed to be less responsive and more avoidant when interacting with their mothers (Riordan et al., 1999). Future research with a larger, carefully matched control sample is required to investigate the relationship further between maternal schizophrenia, infant acceptability to the mother and infant interactive responsivity.

Discriminant Validity

There was evidence for the tool's discriminant validity both as a whole instrument and also at the level of its Domains. At the level of Domains, discriminant validity was shown by the variation in relationship between each domain with other external measures. The Emotional Domain related more strongly than the Instrumental Domain to measures of sensitivity during feeding (NCAST-F) and infant mind-mindedness (MM). The Instrumental Domain showed a stronger relationship than the Emotional Domain to the practical aspects of parenting-related function, as measured by CAN-M items such as *looking after the home*, *self-care*, *budgeting* and *accessing benefits*. The varying correlations between CAN-M items with INCAS Emotional and Instrumental domain scores highlights further that the domains measure different parenting areas. While CAN-M *mood symptoms* correlated significantly with the INCAS Emotional Domain, it did not relate strongly to the Instrumental Domain. Similarly, CAN-M *feeling close to child* related more strongly to the Emotional Domain than the Instrumental Domain. These findings relate to hypothesis X, supporting the notion that within the current population, the Emotional and Instrumental Domains measure distinct sub-components of the role.

Support for the discriminant validity of the INCAS as a whole as put forth in hypothesis IX was demonstrated by the stronger relationship of the INCAS with the NCAST (a measure of outward emotional sensitivity during feeding) than the PSI (a measure of internal parenting stress). Stress is an inner psychological state and, while still part of the parenting capacity construct, was expected to draw upon different sub-areas than the observational behavioural measures. These findings demonstrate that the INCAS measures infant-directed caregiving behaviours to a greater extent than it does inner psychological states.

Criterion Validity

Criterion validity was considered with regard to maternal diagnostic status (schizophrenia, mood disorder or no psychiatric illness) (hypothesis XI) and child protection intervention status (child protection services involved versus not involved with the family during the study) (hypothesis XII). The INCAS was able to distinguish between healthy mothers and those with schizophrenia and, more challengingly, between schizophrenia and mood disorders. The INCAS was not able to distinguish between clinical and healthy controls. It should be noted, however, that clinician VAS ratings were also unable to distinguish between the control groups. This likely points to a sample-specific issue and may necessitate further investigation. At the level of dimensions, *adaptability*, *emotion regulation*, *protection* and *provision* were the best indicators of differing maternal diagnostic status. This information is fine-grained, and provides a valuable contribution to what is known about the parenting of mothers with schizophrenia.

Criterion validity was also explored with regard to the ability of the INCAS to *predict* category membership (i.e. diagnostic group). Instrumental and Total INCAS scores were found to significantly predict diagnostic group membership, while Emotional Domain scores approached significance. The odds of a diagnosis of schizophrenia versus either no psychiatric illness or a mood disorder were significantly lower with each 1-point rise in INCAS score. However while the INCAS was a powerful predictor of healthy diagnostic status, it was only able to predict the diagnostic category of around half of the mothers in the schizophrenia group and 10% of the mothers in the clinical control group. This supports the contention that there is a broad range of ability within any diagnostic category regarding parenting capacity, such that knowing a parent's diagnostic category "reveals little about (their) parenting capacity" (Risley-Curtiss et al., 2004 p.110).

The INCAS holds an orthogonal purpose to diagnostic instruments in that its intended use concerns the measurement of caregiving capacity, not diagnostic status. While it is important that the INCAS relates to maternal diagnostic status, it is also important for it not to map onto diagnosis entirely. There is a high incidence of discrimination against people with psychiatric illness regarding their viability as parents (Dolman et al., 2013; Hipwell & Kumar, 1996; Howard et al., 2003; Howard et al., 2004; Kumar et al., 1995). A recent UK study found that one in five unwell parents had experienced discrimination in relation to starting a family, and almost a third had been discriminated against as parents in general by the services, purely as a result of their diagnosis (Jeffery et al., 2013). Our findings support the notion that diagnosis of itself is not sufficient for determining caregiving capacity, but rather that the competence of parents with serious psychiatric illness should be measured with tools such as the INCAS.

Compared to the INCAS, the NCAST succeeded in capturing more of the disparity between the two Control groups. However, while distinguishing well between healthy and clinical controls, the NCAST failed to define the limitations of the schizophrenia group with the sensitivity demonstrated by the INCAS. It could be that the NCAST is less sensitive to the deficits associated with schizophrenia due to its less demanding test procedure and, specifically, its less challenging behavioural sample. This finding lends support to the importance of incorporating a representative behavioural sample into caregiving assessment for decision-making and intervention-planning purposes. Another factor detracting from the NCAST's sensitivity to schizophrenia may be its lack of instrumental dimensions. It was concluded that, while the NCAST is a powerful tool for the well and mood-disordered cohorts, it is not sensitive to the difficulties experienced by the more severe end of the parenting spectrum (i.e. mothers with schizophrenia).

The ability of the INCAS to capture variance at the lower end of the ability spectrum is significant for its utility with schizophrenia. The absence of a 'floor effect' is essential in order to describe difficulties at a level of detail that is sufficient for directing treatment activities. The ecological validity of its behavioural sample brings the INCAS closer to what is meant by Azar et al. (1998) in their specification of a functional-contextual approach to assessment. Relative to existing assessments, the incorporation within the INCAS of an

Instrumental domain renders it a better match to what is set out in the Framework of Need (Department of Health, 2000) regarding the construct of parenting capacity.

The second benchmark for criterion validity was child protection intervention status. There were significant differences in the INCAS Total and Emotional Domain scores of mothers who were involved vs. not involved with child protective services. The between-group difference in Instrumental Domain scores was marginally significant. The instrumental component of caregiving may be less predictive of status on this criterion due to a lack of consideration of instrumental skills during current child protection evaluations. Involvement of child protective services may reflect not only the parenting capacity of the mother, but also the risk-detecting capacity of current child protection procedures. The fact that instrumental aspects of caregiving are not observed in a routine way during child protection evaluation suggests that current procedures do not attribute a great deal of importance to this aspect of the caregiving role. As documented within the literature, however, instrumental caregiving forms a highly significant part of the role (see Chapter 2 for review).

While able to discriminate between groups regarding child protection intervention, the INCAS was not able to *predict* the status of mothers on this criterion. This confirms that the INCAS should not be used in isolation to determine outcomes in child protection proceedings. This finding is in line with the literature, which proposes that assessment for child protection proceedings should encompass a broad range of factors and use a multi-method, multi-source, and multi-session approach (Budd, 2001). While the INCAS alone is not sufficient for decision-making, it shows a strong ability to converge with child protection involvement. Results of the logistic regression showed that a good proportion of the variance in child protection involvement was accounted for by the INCAS. In all cases, higher INCAS scores were associated with lower odds of service engagement.

One of the purposes of an instrument like the INCAS is to provide some objectivity in the very difficult area of child protection work. A case may be heavily influenced by the presence of cumulative risk factors such as marital status and psychiatric illness where child protection is concerned (Glangeaud-Freudenthal et al., 2013; Howard et al., 2003). These risk factors are commonly present in mothers with schizophrenia, who are by default placed under higher levels of scrutiny (with a higher threshold for ‘good-enough’) than mothers who do not have schizophrenia. Consequently, normal inadequacies of an early-stage mother will be viewed more critically when there are cumulative risk factors present. The inherent bias in the allocation process for child protection strengthens the argument for having an objective measure incorporated in decision-making.

Overall, these results highlight that there is a range of capacity within and across diagnostic groups regarding parenting. Diagnosis of itself is in no way sufficient for indicating child protection involvement. The knee-jerk enlistment of child protective services when caring for mothers with schizophrenia can negatively affect their coping and add cost to an overburdened healthcare system (Lagan et al., 2009). A quantitative assessment of caregiving skills yields information beyond what is provided by cumulative risk factors alone. The INCAS provides information that is more descriptive and reliable than that generated by a check-list style enquiry into cumulative risk coupled with informal observation of the dyad. This is then useful for designing interventions aimed at improving the mother’s skill set, unlike risk factors alone, which do not help in guiding treatment. Rather than estimating capacity using contextual information, the current findings suggest that direct measurement with a structured observational tool is more accurate and helpful in guiding treatment.

Predictive Validity

Predictive validity of the postpartum INCAS was examined in terms of its ability to account for the infant's 12 month development and attachment security. As highlighted, the veracity of findings was compromised by low numbers at follow-up. Results should be viewed in a conservative light, with future replication required.

It was found that the quality of postpartum handling (indexed by INCAS *holding* scores) relates to cognitive development at one year of age, as measured by the BSID *cognition* scale (Bayley, 2006). It was also found that the ability of the mother to provide for and verbally mentalise for her infant during the postpartum period, indexed by INCAS *provision* and *mindedness* scores, relates to the infant's level of receptive communication at one year (measured with the BSID *receptive communication* scale) (Bayley, 2006) (Appendix 20). The strong relationship between early *mindedness* and the development of receptive communication suggests that accurate understanding mirrored in early infancy helps the ability to understand others to emerge across the first year. This finding builds on the literature linking early maternal mind-mindedness with later emotional development of the child (Meins, Fernyhough, Fradley, & Tuckey, 2001; Meins et al., 2002). At the INCAS Domain and Total score level, it was found that high quality practical care in the postpartum period (indexed by INCAS Instrumental Domain scores) predicts stronger receptive communication at one year (Bayley, 2006).

These findings highlight the importance of measuring instrumental caregiving early in the relationship due to its demonstrated influence on development. The strong links between early instrumental care and development at one year supports Sroufe's (1996) theorised developmental 'issues' between 0-3 months which include the assisted regulation of physical states (homeostasis) through appropriate physical caregiving. The current literature is replete with explorations of emotional caregiving skills, but largely neglects the importance of practical skills in the support of an infant's development.

The second indicator of predictive validity was attachment security at one year, as indexed by the Strange Situation Procedure (SSP) (Ainsworth et al., 1978). The highest rate of secure attachment observed in the healthy control group is in line with the literature regarding maternal psychiatric illness and attachment security (see Chapter 1). The INCAS was accurate in predicting attachment security at one year. At the Domain and Total score level, the relationship was strongest between attachment security and INCAS Total scores. Between the Domains, attachment security related more strongly to Instrumental than Emotional Domain scores. Theoretically, attachment concerns the infant's evolutionary drive towards self-preservation through maintenance of proximity to the caregiver. It may be the case that the instrumental aspects of caregiving measured by the INCAS generate feelings of safety and security (to a larger extent than indicated by the content of other parenting assessments and the literature). Instrumental caregiving warrants more coverage in the literature and, importantly, in parenting assessment (and intervention).

At the level of dimensions, the strongest correlations were found between SSP security and postpartum *affection*, *mindedness* and *diligence*. *Diligence* may be a good indicator of early maternal consistency and reliability, important aspects of 'secure base behaviour' said to support the emerging attachment relationship (Marvin, 2002). Ainsworth's data from Ugandan and American populations illustrated the early relationship qualities that contribute to emerging attachment. The current study builds on this work by identifying the behavioural aspects of earliest caregiving that underpin secure-base parenting. Larger participant numbers are required to explore the issue further There would be value in testing the postpartum precursors to organised vs. disorganised attachment, together with each classification (secure, avoidant, ambivalent), and the numerous sub-classes within these. At this stage, there is evidence to suggest that the INCAS predicts security of attachment at one year, a promising early finding.

Methodological Considerations

Findings regarding predictive validity of the INCAS should be interpreted with caution due to the high rate of participant attrition across the year. As the numbers were essentially insufficient for the analyses, the findings should be deemed preliminary. The administrative burden on participants was excessive, particularly for the clinical groups, who had their symptoms to deal with alongside the caregiving role. Having recently given birth, many participants felt too busy, tired, and/or preoccupied with their infants to contend with vast numbers of test forms. In the clinical groups, many mothers were contending with changes to their medications to balance instability precipitated by fluctuating hormones and sleep deprivation. Most mothers with schizophrenia required in-person support with forms, and were not at all times able, available or willing to dedicate the time involved in this aspect of participation in the study.

Overall regarding the INCAS, further studies are required to assess whether the current factor structure is replicated with larger numbers. Cell sizes within this study were small, so results should be interpreted accordingly. Recruitment was difficult due to a combination of factors relating to the system, the mothers and the study. Systemic issues included an overall low point-prevalence of postpartum mothers with schizophrenia, reduced further by the hidden nature of this parenting population, who commonly shy away from the services. Within thought-disordered populations, patients are often identified numerous times as participants for research studies (Candilis, 2006). In the current case, many health professionals were reluctant to expose mothers with schizophrenia to the research due to their existing difficulties retaining them as patients.

Reluctance and fear in the mothers was also a barrier. Mothers were generally quite symptomatic after childbirth, and were seldom willing to engage in a project that could potentially attract scrutiny from the services. Symptoms of the illness increased the sense of persecution and hostility in mothers, adding to the stress associated with their legitimate concerns about having their children removed. Some mothers had experienced previous custody loss and, for this reason, felt unwilling to expose themselves to further parenting assessment. In all, over half of the mothers with schizophrenia who were approached declined to participate in the study. It was common for mothers (both with and without schizophrenia) to be deterred by the test-like procedures involved (i.e. filmed caregiving tasks and cognitive assessment). Many mothers with schizophrenia had some degree of insight into their parenting and cognitive limitations and chose not to participate as a result. Other factors that impeded schizophrenia group recruitment included: impaired ability to give consent where psychosis was severe: poor social support, which interfered with ability to attend for appointments; and the issue of residential transience. Factors relating to the study that obstructed recruitment and retention included the length of the testing protocol, the invasiveness of filming, and incompatibility of some activities with cultural sensitivities (e.g. filmed breastfeeding and bathing). In all, recruitment was challenging indeed. Even so, the current findings remain promising for the field and suggest validity and reliability of the INCAS.

Regarding item development and selection, it should be noted that the expert panel did not adequately represent the array of professionals working in infant care. Specifically, it was composed largely of academics and psychiatrists, with only two nurses agreeing to participate on the panel. Future efforts at validating the INCAS will focus upon gaining more feedback from midwives, early childhood nurses and other professionals with day-to-day experience in infant care.

Considerations Regarding the INCAS

While the INCAS is grounded in clinical experience, the tool is yet to be tested within the full range of parenting difficulty associated with maternal schizophrenia. The narrow inclusion and exclusion criteria for the study (e.g. excluding mothers who use illicit substances and those whose infants have been removed) impeded testing over the full range of functional disturbance that can occur in association with the illness. Substance misuse is prevalent in schizophrenia and, as such, the INCAS requires validation on these mothers if it is to be useful and meaningful for the population. It is unclear at this stage what effect various substances will have on the measurement of early caregiving capacity. The episodic effect of substance misuse may cloud the tool's ability to predict the range of capacity over intoxicated and non-intoxicated states.

The current findings highlight that the INCAS requires sensitivity to cultural diversity in parenting practices. In East Asian populations, for example, cultural norms dictate that much of the infant's instrumental care is not carried out by the mother postpartum (Davis, 2001). In the current study, this impacted significantly on measurement of instrumental skills with the INCAS. Within the current sample, reduced maternal handling of the infant following childbirth decreased scoring on instrumental items such as *holding* and *competence*. Customs in other cultures will require appropriate consideration. For example, newborn feeding practices that are considered risky in Western culture are common among some Hindu and Muslim communities, such as feeding non-milk products (prelacteals) to the infant prior to the establishment of breastfeeding (Fikree, Ali, Durocher, & Rahbar, 2005; McKenna & Shankar, 2009). These cultural norms would need to be considered when rating such mothers on *protection* and *provision* with the INCAS. Differences in mother-infant interaction style and quantity are also observed across cultures. This makes it necessary to incorporate culturally relevant rating criteria on the *interaction* dimension of the INCAS

(Bornstein, Cote & Venuti, 2001; Senese, Bornstein, Haynes, Rossi & Venuti, 2012). International validation will form an essential component of ongoing instrument development.

Although the INCAS was developed for mothers with psychiatric illness, preliminary findings suggest that it has a role in the assessment of all mothers. While numbers were small, validation data indicate that the tool may be useful across the general population in the routine assessment of early caregiving capacity and, potentially, as an antenatal educational tool. Future efforts will be aimed at developing a training program for mother-infant pairs, using video-feedback methodology. Expressions of interest to do so have been communicated by Erasmus MC Hospital in Rotterdam and by the BeyondBlue initiative in Australia. A first step will involve evaluating the tool's psychometric properties on a larger sample of the healthy population. It will also be normed for use with fathers at this time.

The utility of the INCAS is yet to be tested in other populations where difficulties are prevalent, such as adolescents and mothers with intellectual disability, personality disorder or substance abuse disorders (Glangeaud-Freudenthal et al., 2013; Howard et al., 2003; Lussier et al., 2010; Mayes & Llewellyn, 2012; Starke, 2010; Taplin & Mattick, 2013; Whitmore et al., 2011). When considering use in the forensic setting, there are important limitations to note. The INCAS was not intended as a decision-making tool in child-protection and custody proceedings. As indicated by findings relating to the tool's criterion validity with respect to child protection intervention status, parenting capacity is a broader construct than that captured by the INCAS alone. Prior to the INCAS becoming recommended for routine use in clinical populations, data need to be collected in far larger numbers of healthy, clinical, high-risk and maltreating parents in order to develop reliable and validated population norms. Additionally, a protocol for incorporating additional contextual information is required, as outlined in the work of Budd (2001).

The timing of assessment is another important consideration. It is preferable to wait for at least a few weeks into the baby's life before using the INCAS for assessment. It takes time to establish a routine way of delivering care to a newborn infant. Delaying assessment will enhance the likelihood of capturing the style of caregiving that endures throughout the first year. This may not be as practical in managing high-risk dyads where earlier (e.g. one week postpartum) assessment can expedite intervention and curtail the infant's exposure to suboptimal care. The tool requires validation for an earlier infant age group so that it is useful in such cases. In the absence of crisis, assessment at a more established point in the relationship is more generally advisable (at least 6-8 weeks postpartum) in order to best represent the coming year.

While the INCAS may identify a host of caregiving deficits, the consequences of doing so are unclear at this stage. There are currently no systematic remediation programs in practice that address the range of deficits identified by the INCAS. It is not certain that all dimensions of caregiving are remediable, rendering the consequences of identifying them unclear. While a mother with learning difficulties causing instrumental caregiving difficulties may be treatable with an adapted form of cognitive remediation, for example, the limitations identified in a mother with a severe antisocial personality disorder may not be so easily addressed. The latter mother may present without the ability to form an empathic bond with her child and, in severe cases, may be unconcerned about the injury occasioned through inadequate caregiving. While the INCAS may have utility in identifying problems, it will not in all cases provide solutions.

The INCAS was designed to provide a clinically useful and rounded assessment of a mother's ability to care for her infant. It was designed to be used by health professionals with experience in the perinatal and mental health fields who regularly see mothers and infants. It is hoped that, in many cases, the fine-grained break-down provided by the INCAS can be used to determine where a mother requires assistance to improve her caregiving capacity. Part of the design of any drug, procedure or assessment tool, however, is to anticipate ways in which it may be used inappropriately and build in relevant safeguards. The safe and professional use of the INCAS requires the following:

- Adoption of a standard operating procedure by adequately trained and qualified personnel.
- Knowledge of the principles underpinning infant mental health and development, including but not limited to a familiarity with the attachment literature and a period of supervised infant observation training.
- A non-judgemental, patient and empathic approach to the client.
- Understanding of the difficulties associated with psychiatric illness.
- Appreciation of the anxiety evoked by assessment, and sensitivity to this.

There will undoubtedly be a number of ways to utilise this instrument in practice. Above all, it is intended that the INCAS be used in a way that promotes a non-threatening and productive alliance with families. Like other transitions, becoming a mother is a developmental milestone. Where difficulties are faced, confidence-building, patient nurturance and care are required of the clinician, such that the mother has a model of 'good-enough' care to internalise and relay to her infant. While rater-training is essential for professional use of the INCAS, it may be the case that, in some clinical situations, filming is not always necessary, particularly where it impedes therapeutic rapport and practical ease of use.

Beyond assessment at presentation, the INCAS has the potential to identify change over time as work with a dyad progresses. Future research is needed to evaluate its efficacy as a therapy-based tool, as well as its sensitivity to change over time. Validation with older infants is also required. The social, emotional, cognitive and motor developments of older infants will need to be accommodated with appropriately adjusted rating criteria. Age-specific rating criteria should reflect the requirement for parents to adapt their caregiving skills.

In the research setting, the INCAS has potential as an evaluation tool for new parenting interventions. It could also serve in studies exploring early caregiving capacity, particularly where maternal psychiatric illness is concerned. While rater training and filming can detract from ease of use, the benefits to reliability, validity and precision of data outweigh these challenges where research usage is concerned. This may not be the case regarding clinical usage, especially in one-to-one treatment.

This research has culminated in early development and piloting of a novel measure of infant caregiving that captures the essentials of 'good-enough' early care. Good feasibility in research settings is evident, together with understanding of reasons the instrument may or may not be acceptable in clinical settings across different parenting populations. The INCAS describes areas of difficulty in schizophrenia that are missed by other gold-standard measures. More detailed information at this early stage of parenting enables intervention at a stage where the inner working model is forming, such that a healthier attachment may follow.

Schizophrenia, Cognition and Early Caregiving Capacity: The Cognitive Hypotheses

This research has also delineated the specific effects of illness-related cognitive deficits on early infant caregiving. The literature showed awareness of the deleterious effects of cognitive deficits on daily functioning in schizophrenia. The present study has shown that cognition has particular relevance and effect in the fundamentally important functional capacity of early infant caregiving. Knowledge of the cause of impairment enhances the ability to effect positive change. In defining and assessing the impact of schizophrenia-associated cognitive deficits on early caregiving capacity, this research establishes an essential precursor to evidence-based treatment.

It was expected that the cognitive deficits associated with schizophrenia would account for a significant portion of the caregiving impairment experienced by this population. The current study aimed to determine the extent to which cognitive deficits contribute to difficulty, relative to other clinical variables.

Cognitive Profile of Mothers with Schizophrenia

The schizophrenia group had significantly impaired cognition relative to healthy controls in the neurocognitive domains of *response speed*, *impulsivity*, *information-processing*, *memory* and *executive functioning*. While the differences were not significant between the schizophrenia and clinical control groups, they were nonetheless pronounced. This is despite neurocognitive deficits being associated with affective disorders (Baune, Li, & Beblo, 2013; Cai et al., 2012; Kessler et al., 2013; Sarapas, Shankman, Harrow, & Goldberg, 2012). The clinical control group scored lower than healthy controls on most domains of neurocognition and on all Wisconsin Card Sort Test items. A lack of power in the study may have caused Type II error in detecting between-group differences.

On the Wisconsin Card Sort Test (Heaton, 2000), the most pronounced areas of discrepancy between the Schizophrenia and Control groups occurred on items that quantified *perseveration*. Perseverative errors signify a failure to adapt cognitively to changed learning conditions and typify one pattern of prefrontal deficits that is repeatedly found in schizophrenia (Iampietro et al., 2012; Lee, Lee, Kweon, Lee, & Lee, 2009; Ortuno et al., 2009). The schizophrenia-specific deficits to INCAS *adaptability* and *emotion regulation* likely relate to a rigid cognitive style, observable in perseverative errors. This neurocognitive deficit very likely translates to a rigid style of behaving toward the infant during caregiving and, in particular, the commonly observed failure among these mothers in using emotional cues to guide infant-directed behaviours. A review (Kurtz et al., 2001) details improvement of executive functions (including perseverative errors) through cognitive remediation. The current findings suggest that remediation in this domain may have flow-on benefits for behavioural flexibility during caregiving.

The overall findings regarding neurocognition in schizophrenia are in line with those from the MATRICS and CNTRICS research programs on neurocognitive deficit in schizophrenia (Barch et al., 2009; Heinrichs & Zakzanis, 1998; Nuechterlein et al., 2004). The present study had the added challenge of distinguishing schizophrenia-related cognitive deficit from so-called 'baby-brain' (Christensen, Leach, & Mackinnon, 2010). The potential impact of the postpartum state on cognition in this case may have reduced the appearance of between-group differences in neurocognition. Additionally, all mothers with schizophrenia were being treated with antipsychotic medication, linked elsewhere to improved cognitive test performance (Davidson et al., 2009; Keefe et al., 2007). Findings may also have been influenced by the choice of neurocognitive test battery. The WebNeuro (Silverstein et al., 2007) was selected here as it is relatively brief, computer-based, portable and able to be administered by non-specialist staff. Its level of sensitivity in comparison to other batteries, on the other hand, is unclear. A final point for consideration is the exclusively female sample used here. There are documented differences in the pattern of neurocognitive abilities of males in comparison to females. These exist alongside sex-related structural brain dimorphisms (Plessen, Hugdahl, Bansal, Hao, & Peterson, 2014). Sex-related disparities in neurocognitive function seen in elderly samples are consistent with those found in younger adults and generally include superior verbal learning and memory in females, and superior visuo-spatial abilities in men (among other differences) (Munro et al., 2012). The all-female composition of the sample in this study is not typical of most research on cognition in schizophrenia, which tends to involve adult men.

Regarding social cognitions, the schizophrenia group demonstrated marked impairment in facial affect processing and theory of mind. There was also a difference between the schizophrenia and control groups in positive event attributional style. Mothers with schizophrenia demonstrated a lower tendency than other groups to 'take credit' for positive happenings, and a lower tendency to attribute negative events to external factors such as situations or other people. This indicates their relatively lower 'self-serving bias', which replicates the widely observed lack of a 'self-serving bias' in people with schizophrenia (e.g. Humphreys & Barrowclough, 2006; Mizrahi et al., 2008).

In most ways, the current findings tie in with previous research on social cognitive impairments in schizophrenia (summarised in Marsh et al., 2013). In some respects, however, findings departed from the literature. Specifically, there were no significant differences between the schizophrenia and control groups in empathy (as measured by the Interpersonal Reactivity Index, IRI) (Davis, 1980, 1983). While some studies demonstrate schizophrenia-associated impairments to the cognitive portion of empathy (measured by the *Perspective Taking* subscale of the IRI) (Davis, 1983; Haker & Rossler, 2009; Shamay-Tsoory et al., 2007), others demonstrated intact affective empathy in schizophrenia, as indexed by normal-range IRI *Empathic Concern* (Fujiwara, 2008; Haker & Rossler, 2009; Shamay-Tsoory et al., 2007) and *Personal Distress* scores (Haker & Rossler, 2009; Shamay-Tsoory et al., 2007). As with neurocognition, however, there are gender differences in empathy that may be relevant in making sense of the current findings. It is commonly found that women are higher in empathy than men (Broidy, Cauffman, Espelage, Mazerolle, & Piquero, 2003; Etxebarria, Ortiz, Conejero, & Pascual, 2009; Hojat et al., 2002). Current findings may therefore diverge from other studies of empathy in schizophrenia as a consequence of the all-female sample. It is also worth considering that postpartum status here may have further reduced the appearance of between-group differences if the differences are hormonally-influenced.

Low effect sizes regarding schizophrenia-specific cognitive deficit here may also relate to selection bias associated with the narrow inclusion criteria. Mothers with schizophrenia in the present sample are likely to be higher-functioning than a naturally occurring cross-section of the population of women or of mothers with schizophrenia, where no such criteria apply. For example, while current criteria excluded mothers without their infant in their care, up to half of the children of mothers with schizophrenia live in alternative care in real-world settings (Dipple, 2002; Howard et al., 2003; Joseph, 1999; Kumar et al., 1995; Park, 2006). Being in a relationship may also indicate a higher degree of functioning and social cognition, as evidenced by ‘together’ marital status. In the current study, there was a higher rate of ‘together’ marital status among mothers with schizophrenia than is typical in the real-world population (Morgan et al., 2011). This points to another area of potential bias within the sample. A final consideration would be that it is difficult to disentangle the ability to continue a relationship from the protective social conventions that may still increase the likelihood of a relationship staying together in the context of a recent birth. Nonetheless, there is evidence to suggest that the current schizophrenia sample may be higher-functioning (and less cognitively impaired) than the real-world schizophrenia population. The extent of bias in the control groups is not known, however regarding the clinical control group, bias is likely. This is because as a general rule, only women with more severe affective illness tend to come under the notice of services. It is likely, therefore, that the current clinical control group were on average more unwell than women with mood disorders in the wider community. The difference in cognition and infant caregiving capacity between the two clinical groups may thus be underestimated in the study at hand.

Despite methodological issues, the cognitive deficit associated with schizophrenia was detected in the sample at hand. Larger participant numbers, broader inclusion criteria and a rigorous neurocognitive assessment battery may have enhanced the appearance of deficits. Other sampling issues likely to have influenced findings include the female gender of this group, together with their relative age and status as postpartum mothers.

Schizophrenia and Caregiving

The research next examined the impact of cognition on caregiving. Specific areas of early caregiving were found to be affected by maternal schizophrenia. The INCAS Total scores of mothers with schizophrenia were significantly lower than those for clinical and healthy controls. Caregiving impairments were also found with respect to Emotional and Instrumental Domain scores in schizophrenia, which were significantly lower than those for both control groups. At the level of dimensions, measurement with the INCAS revealed some finer-grained impairments in relation to maternal schizophrenia. A diagnosis of schizophrenia predicted lower scores in *adaptability*, *emotion regulation*, *protection* and *provision*. Specifically, where a mother's intended caregiving routine did not fit with the demands of the situation on the day, the mother was less likely to alter her plan if she had a diagnosis of schizophrenia.

An example of this rigidity (reflected in low *adaptability*) was seen in a mother who failed to alter her infant's planned outfit (a heavy woollen suit) on an unexpectedly hot day. Although she commented on the weather while bathing her infant (i.e. noting the changed conditions and the heat), she did not adapt to the infant's changed needs (i.e. cooler clothing) in relation to this change in weather and, as a consequence, the infant later appeared flushed and bothered in his suit. Lower *emotion regulation* among mothers with schizophrenia indicated the lower incidence with which they geared their caregiving behaviours towards maintenance of infant homeostasis. This may suggest an illness-associated difficulty with reading infant states that relates to impaired facial affect processing in this group. Impaired mirroring of yawning and laughing, termed 'resonance', has been observed in association with schizophrenia (Haker & Rossler, 2009). This autonomic aspect of detecting other-states is likely associated with the lower *emotion regulation* scores observed currently.

A diagnosis of schizophrenia predicted difficulty with providing for the infant in a material sense, as indicated by lower scoring on *provision.* As well as reflecting deficits in instrumental caregiving, this finding also highlights the marginalised socioeconomic status of mothers with schizophrenia. There is a need for clinicians to advocate and ensure that all available benefits and services are being accessed by this disadvantaged group. Lower *protection* scores reflected behaviours such as leaving the room while the baby was on the change-table and handling without supporting the infant's neck. Low *protection* scores indicate a need for intervention aimed at developing the basic safety behaviours of mothers with schizophrenia.

In identifying and measuring infant caregiving capacity in detail, this study has expanded on what was previously known about the specific effects of schizophrenia on early parenting while developing a unique measure of this function. Research to date has described the interactive deficits of this parenting group, but has not covered the finer-grained aspects of impairment specific to mothers with schizophrenia. The INCAS has shown an ability to measure a broad range of skills essential in 'good-enough' early caregiving. It has also demonstrated a window of measurement commensurate with the variance in abilities of this cohort. These domains can be clearly related to function and, optimally, to the development of specific remediation programs.

Impact of Clinical Variables on Parenting Capacity

An important finding was that it is not only the diagnosis of schizophrenia that has an impact on infant caregiving capacity; so too do high levels of anxiety. Anxiety had a powerful negative effect on INCAS Total and Emotional Domain scores in all groups. Anecdotally, more anxious mothers in the study exhibited a tendency towards rougher handling of the infant and a more task-centred, objective approach than mothers with calmer demeanours.

It is not surprising that an excess of arousal in the mother would lessen her ability to guard against, attend to and contain the difficult states of her infant. Maternal anxiety is often preceded by antenatal anxiety, which has been demonstrated to pre-program the infant's Hypothalamic-Pituitary-Adrenal (HPA) axis in utero, perhaps sensitising the infant to postpartum stressors (Alder et al., 2007; Andersson et al., 2004a, 2004b; Austin et al., 2005; Bekkhus et al., 2011; Bergman et al., 2010; Buitelaar et al., 2003; Buss et al., 2010; Davis et al., 2007; Davis et al., 2011; Glover, 2011; Glover & O'Connor, 2002; O'Connor et al., 2002; Werner et al., 2007). There was a strong relationship in the present study between antenatal and postnatal maternal anxiety. It is possible that the lowered postpartum caregiving scores of mothers with high anxiety could relate in part to a more difficult-to-soothe postpartum infant. It is interesting to note here that significant positive correlations were found between INCAS scores and NCAST Infant Responsivity to Caregiver sub-domain scores and NCAST Infant

Total Domain scores (Appendix 19). This suggests a link between infant behaviour and maternal caregiving (and perhaps implies a need to reconsider the inclusion of infant scales within the INCAS). On the basis of this study, however, it is not possible to tease out the direction of causality in this relationship.

The schizophrenia group mothers showed normal-range DASS anxiety scores, despite Parenting Stress Index (PSI) (Abidin, 1990) scores showing the highest number of external life stressors in this group, relative to clinical and healthy controls. The DASS has been validated for use in schizophrenia (Ng, 2007). Non-clinical range values of anxiety have been noted in other large studies of subjects with schizophrenia, but this lack of reactivity to external stress may well be a product of affective blunting or a lower level of insight (Markova, 2005). Unfortunately, insight was not measured in the study at hand. This lack of reactivity to difficult external circumstances was also seen in the current study when self-reported quality of life ratings were contrasted with observer-rated scales of the same construct. Anxiety is best thought of as an independent domain of psychopathology in schizophrenia that is closely linked to depression (as it is for the rest of the population) (van der Gaag et al., 2006). All mothers with schizophrenia in the present study were taking antipsychotic medications. These drugs can exert a powerful anxiolytic effect, and this too may have moderated responsivity to external life stressors.

Unlike anxiety, depression did not predict postpartum INCAS scores. This finding was contrary to expectations and previous research, where there are widely demonstrated links between depression and impaired emotional caregiving functions such as sensitivity, responsivity, emotional availability, stimulation and interaction (Field, 2010; Liberto, 2012; Logsdon, Wisner, & Pinto-Foltz, 2006; Murray, 1996), together with negative parenting behaviours such as coercion, negative affect and intrusiveness (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). It may be that the anxiety and stress often comorbid with depression (not always measured in studies examining depression and parenting) are more potent inhibitors of emotional parenting skills than depressive symptoms alone.

A diagnosis of schizophrenia was found to negatively impact INCAS Total, Emotional and Instrumental Domain scores. When the nature of this association was further investigated, diagnosis but not psychotic symptoms, medication, or level of depression predicted caregiving (INCAS) scores. This part of the study is certainly underpowered and further research with more than 13 subjects is required, particularly with regard to investigating the likely effect of negative symptoms on early caregiving. Other research, however, demonstrates that the clinical features of schizophrenia are not sufficient to explain the impaired infant caregiving of this group (Wan, Salmon, et al., 2007). It seems likely that something apart from symptomatology contributes to poor functional outcome in schizophrenia, namely, the illness-associated cognitive deficit.

Cognition and Early Caregiving Capacity

Broad areas of deficit to attention, concentration, processing speed, memory and executive functions have been identified in people with schizophrenia (Heinrichs, 1998). These cognitive deficits have been demonstrated to impact on the functioning of people with the illness (Fitzgerald, 2004; Green, 1996). It has also been established that impaired *social cognitions* impact independently on functioning in schizophrenia (Sergi et al., 2007). While reduction in positive and negative symptoms has been shown to improve infant caregiving in mothers with schizophrenia, research shows that symptoms alone do not account for impaired infant caregiving in mothers with schizophrenia (Wan, Salmon, et al., 2007).

It was hypothesised in the current study that cognition (neurocognition and social cognition) would independently and significantly contribute to early caregiving capacity. The step-wise regression analyses confirmed that cognition has a separable effect on infant caregiving capacity, above and beyond other predictors. A modest (but non-significant) direct impact of neurocognition on caregiving scores was observed in this study, together with a stronger direct influence of social cognition. Path analysis suggested that social cognition mediates the relationship between neurocognition and caregiving capacity, such that neurocognition affects caregiving *indirectly* through its strong impact on social cognition.

The social cognitions of facial affect recognition and attributional style were found to influence INCAS scores directly. Facial affect recognition had an especially broad impact on caregiving capacity, with effect sizes strongest for negative facial affect. Negative infant states signal disturbed homeostasis relating to pain, alarm, hunger and fatigue. As language and speech are not available to the early infant, the ability to detect and respond to negative facial affect is an important prerequisite in early caregiving. Eminent researchers have proposed the existence of a basic set of emotions developed by evolutionary pressures, associated with a specific physiology and underlying network of brain activation and recognised by a characteristic and distinct facial expression (Darwin, 1872; Ekman, 1993; Ekman et al., 1972). It is intuitively appealing as well as functionally significant that this basic and atavistic response of humans is linked to early caregiving in the study at hand.

The current finding that facial affect recognition is predictive of infant caregiving capacity has significant implications for clinical practice. This finding is especially important in light of the success of emotion recognition training, a targeted approach to social cognitive remediation in schizophrenia (Marsh et al., 2013). The promising findings linking improved facial affect recognition with this style of remediation in schizophrenia (Horan et al., 2008; Marsh et al., 2010; Marsh et al., 2012; Russell et al., 2008) suggest that emotion recognition training may prove efficacious in ameliorating some parenting-related difficulties that are encountered by mothers with schizophrenia.

Regarding attributional style, the tendency to internalise blame for negative events was found to significantly predict lower INCAS Total, Emotional and Instrumental Domain scores. Contrary to expectations, an externalising attributional style and self-serving bias were positively related to infant caregiving capacity. This association was also reflected in the validation study findings for factor structure and internal consistency. The negative affective states caused by internalising, especially when things go wrong, likely resemble the stress and anxiety measured by the DASS (Lovibond & Lovibond, 1995), which related negatively to emotional caregiving.

That an attributional style closely associated with depression and anxiety predicts poor caregiving capacity across all parenting groups reinforces the utility of the INCAS beyond the target group of schizophrenia. As can be seen by traditional patterns of birthing and early child rearing, the intensive work of caring for an infant is not something to be done by the mother alone. The ability to engage significant others in raising an infant may be a marker of safe and effective caregiving. This would be expedited by an externalising style and a self-serving bias, and may explain why an externalising attributional bias in this study predicted an increase in caregiving (INCAS) scores. When the data were reduced to an aggregate measure of social cognition, theory of mind was also found to be important in determining caregiving capacity, suggesting that the ability to understand the internal processes of others supports those capacities measured by the INCAS.

Given the range of social cognitions affecting infant caregiving capacity, broader approaches may prove effective in supporting improvements to early caregiving in schizophrenia. Marsh et al. (2013) describe broad-based approaches to social cognitive remediation that address impaired facial affect recognition, social perception, attributional bias and theory of mind such as their own SoCog program, Penn's Social Cognitive and Interaction Training (SCIT) (Combs et al., 2007; Penn, Roberts, Combs, & Sterne, 2007), and

Horan's Social Cognitive Skills Training (SCST) (Horan et al., 2011). Social Cognition Enhancement Training (Choi & Kwon, 2006) is another cognitive remediation package that has demonstrated efficacy in schizophrenia (Barlati, Deste, De Peri, Ariu, & Vita, 2013).

The current findings may indicate that the cognitive deficits at baseline which were associated with the schizophrenia group independently account for a relevant proportion of between-group variance in caregiving capacity, relative to other illness-related features in this very small group. These findings coincide with previous research where a stronger direct relationship between social cognition and functioning is demonstrated, relative to neurocognition (Fett et al., 2011). In light of the large number of regressions conducted here, the current findings should be viewed as preliminary only. Future replication with larger participant groups is needed to interpret the current findings reliably.

Exploring the Relationship Between Cognition and Caregiving

Path analyses were performed to further investigate the relationship between cognition and caregiving capacity. The third cognitive hypothesis was based on previous findings that social cognition mediates the effect of neurocognition on various aspects of social functioning (Addington et al., 2010; Addington et al., 2006; Bell, 2009; Sergi et al., 2006; Toomey et al., 1997; Wynn et al., 2005). The current study adds to the literature by demonstrating that this relationship may also apply to early caregiving.

The path analysis clarified that social cognition mediates the relationship between neurocognition and caregiving capacity such that neurocognition, through its strong impact on social cognition, affects caregiving *indirectly*. The mediation model, which excluded the direct effects of neurocognition on caregiving, fitted the data better than the basic model, suggesting that where a mother has schizophrenia, the impact of her cognitive deficit upon her caregiving capacity is mediated through social cognition. This is consistent with theoretical models that place social cognition as a mediator in the relationship between neurocognition and functional outcome in schizophrenia (Brekke et al., 2005; Green & Nuechterlein, 1999). Findings relating to the path analyses in the study at hand indicate that neurocognition has a positive impact on social cognition and a positive impact on infant caregiving capacity through its influence on social cognition. The findings also help to explain the weaker direct relationship between neurocognition and scores on the INCAS.

This analysis was challenged by the need to reduce the number of variables put into the model due to the small number of study participants. Data were reduced to aggregate measures of latent neurocognition and social cognition constructs. The *Neurocognition* variable reflected the elements of information processing, memory, executive function, attention and impulsivity, while *Social Cognition* reflected theory of mind and facial affect recognition. The confirmatory factor analysis showed that all measured variables made significant contributions to their respective latent variables. However WN *response speed* was lost from the composite neurocognitive variable, despite it being one of the differentiating items between groups. Results of the path analyses are consistent with other studies which have dealt with these constructs in a similar way (Addington et al., 2010; Bell, 2009; Sergi et al., 2006).

The ability of the model to explain the relationship between cognition and caregiving capacity could be improved by further work including the effects of clinical variables such as negative symptoms, which have been noted to contribute to models of outcome in schizophrenia (Lin et al., 2013; Sergi et al., 2007), and anxiety, which was a significant independent predictor of caregiving in this study.

Methodological Considerations

When interpreting the findings regarding the cognitive hypotheses, a number of methodological issues require consideration. Importantly, it is optimal not to use the same cohort for scale validation and the testing of study hypotheses. While necessary for feasibility in the context of a postgraduate research degree, it will be essential to re-test the cognitive hypotheses on an independent participant sample for the peer-reviewed literature. A general difficulty in the examination of the mothers with schizophrenia is that much of the literature refers to an "average" group of people with schizophrenia who are predominantly male and middle-aged. This is significant when considering where the current group may sit in relation to likely response to new treatments. As noted by other researchers, women with schizophrenia form a small and often ignored patient group whose special needs are not adequately understood (Castle, 2000). The ongoing effects of medication on hormonal status, together with the ability to manipulate or use oestrogen or oestrogen-modifying agents to treat schizophrenia in women in particular, require testing (despite the ethical and logistic problems of researching in this population).

The current study schizophrenia group is unlikely to be representative of the real-world population of mothers with schizophrenia. In the current study, mothers were excluded if their babies had been removed by child protective services. As a result, only the most competent mothers with schizophrenia qualified for inclusion, with up to 50% of this parenting cohort excluded (Abel et al., 2005; Glangeaud-Freudenthal et al., 2013; Howard et al., 2003; Howard, Goss et al., 2004; Howard, Thornicroft et al., 2004; Joseph, 1999; Kumar et al., 1995; Miller & Finnerty, 1996; Salmon et al., 2003; Whitmore et al., 2011).

Most of the mothers with schizophrenia in this sample were in stable marriages. In the general population of women with schizophrenia, it is estimated that only around half are parents and, within these, single motherhood is more prevalent (Morgan et al., 2011). It is likely that the current sample had better social abilities (and, by extension, less severe illness and less impaired social cognition) than would more typically be seen in mothers with schizophrenia. While the current group of mothers with schizophrenia did demonstrate lower cognitive scores on most measures of ability, most mothers with schizophrenia scored within or close to the average range of functioning. The potentially biased schizophrenia group sampling carries ramifications for the cognitive hypotheses.

While the lack of a significant difference between the two clinical groups on neurocognitive variables replicates some previous studies comparing schizophrenia with affective disorders (e.g. Waford & Lewine, 2010), it is possible that the test-like nature of this study caused mothers with competence to self-select for inclusion. Given the likely bias in the sample, a more comprehensive measure of intellectual potential may have more sensitively detected between-group differences in neurocognition. The Wechsler Adult Intelligence Scale (WAIS) is a gold-standard measure of cognitive ability with Australian normative data. It is commonly used in schizophrenia research (Ciobanu, Vogel, Cooper, Hughes, & Allen, 2014; Fraguas et al., 2014; Michel et al., 2013; Nilsson, Holm, Hultman, & Ekselius, 2014; Vaskinn et al., 2014) and is available in an interactive web-based form. Another emerging gold-standard measure of cognition in schizophrenia is the MATRICS Consensus Cognitive Battery (MCCB) (Kern et al., 2011; Kern et al., 2008; Nuechterlein et al., 2008). Other studies of cognition in schizophrenia tend to use a combination of measures for more detailed information regarding cognition (Fraguas et al., 2014; Gonzalez-Liencres et al., 2014; Guo et al., 2014; Lam et al., 2014; Nilsson et al., 2014; Vaskinn et al., 2014). The use of a more detailed cognitive battery in the current case needs to be balanced with consideration of the duration of the assessment procedures. As a rule, early-stage mothers are time-poor; the current protocol took 3-4 hours and was experienced as tiring by a significant subgroup.

As discussed earlier, alcohol and/or substance misuse was another exclusion condition that may have biased sample selection. Substance dependence among schizophrenia sufferers is well documented in the literature. According to recent Australian data on women with psychotic illnesses, almost 40% have lifetime alcohol misuse or dependence, a similar proportion report drug misuse or dependence, and 30% have used cannabis in the last year, with almost 60% reporting weekly use of the drug (Morgan et al., 2011). The current results cannot therefore be generalised to the entire schizophrenia population. Future research with broader inclusion criteria is required to represent all mothers with schizophrenia.

Another methodological consideration relates to the baseline clinical data. While it was beyond the scope of the study at hand, it would have been useful to formally evaluate and control for personality disorder due to its known effects on parenting capacity (Newman, Stevenson, Bergman, & Boyce, 2007; Stepp, Whalen, Pilkonis, Hipwell, & Levine, 2012; Zalewski et al., 2014). In the study (particularly in the clinical control group), some mothers exhibited clear signs of personality disorder. Features observed included ongoing feuding with friends and family, arguments over the phone that were peppered with suicidal threats, and scars from self-reported histories of self-harming. The higher conflict and lower support scores on the Interpersonal Relationships Inventory (IPRI) (Tilden et al., 1990) among clinical controls could also be taken to indicate unstable relationships, another marker of personality disorder.

Other research links pathology related to personality disorders (borderline personality disorder in particular) to early trauma (especially in relation to the parent's own experience of being parented) (Blasczyk-Schiep, 2014; Bornovalova, 2013; Hernandez, 2012; Laporte, 2012; Lyons-Ruth, 2013; Martin-Blanco, 2014; Newnham, 2014; Perepletchikova, 2012; Vermetten, 2014). In light of this, it would also have been relevant to quantify early maternal trauma. A recent study of postpartum mothers with psychiatric illness incorporated a version of the Marce Clinical Checklist with questions relating to traumatic events in childhood and adolescence. It was discovered that a quarter of women enrolled in the study had been separated from their own mothers during childhood, and a third of participants reported a history of childhood sexual and/or physical abuse (Glangeaud-Freudenthal et al., 2013). Trauma is a prevalent illness-related feature that may have confounded current findings and, as such, requires further investigation. Given the high prevalence of early trauma in mothers with psychiatric illness and schizophrenia in particular (Miller & Finnerty, 1996), future research with the INCAS is needed to explore the impact of prior maternal trauma upon infant caregiving capacity.

Finally, further work is required to develop a consensus on the way in which social cognition should be defined across studies. There is currently no universally accepted standard for testing or indexing the latent construct. Consequently, the results within this study will be difficult to compare with other research on social cognition and schizophrenia.

Future Directions

The broader literature are consistent with these preliminary findings and indicate that particular aspects of cognitive functioning in schizophrenia are relevant targets for intervention in new mothers with schizophrenia. The path analyses imply that interventions at the neurocognitive level could have a positive impact on social cognition, which may in turn have the flow-on effect of improving infant caregiving capacity. Neurocognitive remediation in itself may assist mothers with schizophrenia, especially from the point of view of improving speed of processing, perseveration and executive processing. Several evaluations of cognitive remediation have demonstrated promising findings for patients with schizophrenia. COGPACK (Marker, 1987-2007) and NEAR (Neuropsychological

Educational Approach to Remediation) (Medalia, 2002) are two neurocognitive remediation programs with proven efficacy in schizophrenia (Barlati et al., 2013).

In addition to interventions aimed at remediating neurocognition, social cognitive deficits should be considered in treatment. As mentioned earlier, the remediation of facial affect recognition is now well-established. Treatments for theory of mind deficits and attributional bias have also been developed. The current study has identified that facial affect recognition, theory of mind and attributional style are facets of social cognition that may directly contribute to infant caregiving capacity. Further work into identifying the specific neurocognitive contributors to these social cognitions could prove valuable where infant caregiving capacity is problematic. It would then be important to evaluate the efficacy of cognitive remediation as a treatment for improving infant caregiving.

Since infant caregiving is strongly related to social cognitive abilities, it would be reasonable to expect that this area of functioning would also be improved with social cognitive remediation. The best results have been found for remediation programs targeting facial affect recognition, with promising findings also evident for programs targeting theory of mind (Kurtz & Richardson, 2012; Marsh et al., 2013). In a pilot intervention combining social cognitive remediation with neurocognitive remediation, Lindenmayer et al. (2013) found that combining cognitive remediation with emotion perception remediation using the Mind Reading: Interactive Guide to Emotions (MRIGE) program produced greater improvements in emotion recognition, emotion discrimination, social functioning and neurocognition than neurocognitive remediation alone in schizophrenia (Lindenmayer et al., 2013). Integrated Neurocognitive Therapy (INT) (Roder, 2006) is another program that targets neurocognition and social cognition simultaneously, with demonstrated effectiveness in schizophrenia (Barlati et al., 2013).

Cognitive remediation in combination with specific skills training has been found to be particularly effective (Wykes, Huddy, Cellard, McGurk, & Czobor, 2011). The antenatal use of specific mothercraft interventions in combination with cognitive remediation could be of immense benefit in treating mothers with parenting difficulties and/or a history of child removal. Little work appears to have been done in developing effective antenatal interventions for mothers with schizophrenia.

In planning the development of targeted intervention, it needs to be remembered that parenting does not end following infancy. The longitudinal benefits of cognitive remediation on caregiving may continue to be evident or, more realistically, may need to be combined with follow-up intervention at subsequent stages of parenting. The question of how cognition affects parenting in schizophrenia should be examined at several points throughout the role. In line with these findings, the requirements in terms of cognitive remediation may vary across different stages of parenting.

Finally, this work has already attracted international attention. We have established research collaborations with a group at Erasmus MC Hospital in Rotterdam to investigate further the validity of the INCAS and the relationship between cognition and early caregiving capacity in mother with schizophrenia. I hope this group will be able to do the important work of replicating the current findings, a necessary step in good science.

Conclusion

Mothers with schizophrenia are likely to experience specific impairments to their parenting capacity in conjunction with their illness. This research has developed a specific measure of early infant caregiving capacity which uniquely includes assessment of both early physical caregiving as well as emotional and interactive caregiving by mothers with serious psychiatric illness. It has provided preliminary feasibility data and validation, together with beginning to delineate the specific impact of schizophrenia on postpartum caregiving while separating out the generic effects of psychiatric illness and reproduction.

The first aim of this project was to develop and validate a measure of infant caregiving that is appropriate for use in the schizophrenia population. An assessment that is reliable and valid was produced to meet this aim. This study forms a preliminary investigation of the psychometric properties of the INCAS. With its feasibility established herein, it is intended that the scale be extensively validated in larger-scale studies to follow. It is hoped that the INCAS will aid in the assessment and management of mothers with schizophrenia and other serious psychiatric illnesses in future. The INCAS provides a structured framework within which complex presenting problems can be analysed and understood in terms of potentially more remediable aspects. By breaking down the tasks of future treatment in this way, the INCAS may enable professionals to provide targeted intervention in otherwise complex situations.

Using the INCAS, this study has measured and compared practical and emotional aspects of parenting capacity of postpartum mothers with schizophrenia to that of healthy and mood-disordered postpartum controls, identifying fine-grained areas of limitation in this disadvantaged group. With this information, it has been possible to determine the relative impediments caused by psychopathology, psychosocial factors and illness-related cognitive deficits. This important and innovative piece of research has produced an evidence-based method of assessing infant caregiving capacity in the vulnerable group of mothers with schizophrenia and has identified potentially remediable contributors to this crucial area of role-functioning.

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Appendices

Appendix 1

Screening Summary

Inclusion Criteria		
	Yes	**No**
1 Mother ≥ 18 years old		
2 Biological mother of infant		
3 Infant ≥ 6wks & ≤ 4mths		
4 Infant residing in mother's care		
5 English literacy		
Group 1: Schizophrenia		
1 Diagnosis of Schizophrenia		
Group 2: Mood Disorders		
1 No history of Schizophrenia		
2 Diagnosed Mood Disorder		
2a. Major Depressive Disorder		
2b. Bipolar Disorder (Type I)		
2c. Bipolar Disorder (Type II)		
Group 3: Healthy Control		
1 No diagnosed psychiatric illness		
2 No history of psychosis		
3 No history of psychiatric disorder requiring psychotropic medication		
Exclusion Criteria		
1 History of head injury (LOC > 60mins)		
2 Organic or acquired ID		
3 Diagnosis of epilepsy or other neurological disorder		
4 Current illicit drug use		
5 Infant congenital, developmental or other health condition		

Y N

Subject eligible ☐ ☐

Informed consent ☐

Subject ID: _____________

Session 2 scheduled: Y N ☐ ☐

Date: _______________

Time: _______________

Venue: _______________

Appendix 2

Participant Flier

Mothers and Babies

We invite you to participate in an exciting new research project!

Benefits for you and your baby include…

- Comprehensive assessment of **YOUR COGNITIVE PROFILE**
- A **DVD KEEPSAKE** of you and your baby
- A detailed assessment of your **PARENTING CAPACITY**
- **MOTHER-BABY ATTACHMENT** rating at one year of age
- **INFANT DEVELOPMENTAL** assessment at one year of age

●☼♥

Assessments are **FREE**, and performed in the comfort of your **OWN HOME!**

●☼♥

Researchers at Westmead Hospital are investigating the first year of life together for mothers and their babies.

For more information, fill in a contact form today

or call

Kathryn Knights on **9845 8704**

or email: **kathryn.knights@sydney.edu.au**

~~~~~

Thankyou
~~~~~

Appendix 3

Example Items from the Positive and Negative Syndrome Scale for Schizophrenia (PANSS) (Kay et al., 1987)

E.g.1. Positive Scale item

P1. Delusions: Beliefs that are unfounded, unrealistic, and idiosyncratic. *Basis for rating:* thought content expressed in the interview and its influence on social relations and behaviour as reported by primary care workers or family.

1	Absent	Definition does not apply.
2	Minimal	Questionable pathology; may be at extreme of normal limits.
3	Mild	Presence of one or two delusions which are vague, uncrystallised, and not tenaciously held. Delusions do not interfere with thinking, social relations or behaviour.
4	Moderate	Presence of either a kaleidoscopic array of poorly formed, unstable delusions or of a few well-formed delusions that occasionally interfere with thinking, social relations or behaviour.
5	Moderate – severe	Presence of numerous well-formed delusions that are tenaciously held and occasionally interfere with thinking, social relations or behaviour.
6	Severe	Presence of a stable set of delusions which are crystallized, possibly systematised, tenaciously held, and clearly interfere with thinking, social relations and behaviour.
7	Extreme	Presence of a stable set of delusions which are either highly systematised or very numerous, and which dominate major facets of the patient's life. This frequently results in inappropriate and irresponsible action, which may even jeopardize the safety of the patient or others.

E.g. 2. Negative Scale item

N1. Blunted affect: Diminished emotional responsiveness as characterised by a reduction in facial expression, modulation of feelings and communicative gestures. *Basis for rating*: observation of physical manifestations of affective tone and emotional responsiveness during the course of interview.

1	Absent	Definition does not apply.
2	Minimal	Questionable pathology; may be at extreme of normal limits.
3	Mild	Changes in facial expression and communicative gestures seem to be stilted, forced, artificial or lacking in modulation.
4	Moderate	Reduced range of facial expression and few expressive gestures result in a dull appearance.
5	Moderate – severe	Affect is generally "flat", with only occasional changes in facial expression and a paucity of communicative gestures.
6	Severe	Marked flatness and deficiency of emotions exhibited most of the time. There may be unmodulated extreme affective discharges, such as excitement, rage or inappropriate uncontrolled laughter.
7	Extreme	Changes in facial expression and evidence of communicative gestures are virtually absent. Patient seems constantly to show a barren or "wooden" expression.

Appendix 4

Item Lists

Mania Rating Scale (MRS) (Young et al., 1978)

Elevated mood
Increased motor activity-energy
Sexual interest
Sleep
Irritability
Speech (rate and amount)
Language-thought disorder
Content
Disruptive-aggressive behaviour
Appearance
Insight

Calgary Depression Scale for Schizophrenia (CDSS) (Addington et al., 1990)

Depression
Hopelessness
Self depreciation
Guilty ideas of reference
Pathological guilt
Morning depression
Early wakening
Suicide
Observed depression (based on interviewer’s observations during the entire interview).

Appendix 5

Liverpool University Neuroleptic Side Effect Rating Scale (LUNSERS) (Day et al., 1995)

Please indicate how much you have experienced each of the following symptoms in the last month by ticking the appropriate boxes.

	NOT AT ALL	VERY LITTLE	A LITTLE	QUITE A LOT	VERY MUCH
1. Rash.	☐	☐	☐	☐	☐
2. Difficulty staying awake during the day.	☐	☐	☐	☐	☐
3. Runny nose.	☐	☐	☐	☐	☐
4. Increased dreaming.	☐	☐	☐	☐	☐
5. Headaches.	☐	☐	☐	☐	☐
6. Dry month.	☐	☐	☐	☐	☐
7. Swollen or tender chest.	☐	☐	☐	☐	☐
8. Chilblains.	☐	☐	☐	☐	☐
9. Difficulty in concentrating.	☐	☐	☐	☐	☐
10. Constipation.	☐	☐	☐	☐	☐
11. Hair loss.	☐	☐	☐	☐	☐

	NOT AT ALL	VERY LITTLE	A LITTLE	QUITE A LOT	VERY MUCH
12. Urine darker than usual.	☐	☐	☐	☐	☐
13. Period problems.	☐	☐	☐	☐	☐
14. Tension.	☐	☐	☐	☐	☐
15. Dizziness.	☐	☐	☐	☐	☐
16. Feeling sick.	☐	☐	☐	☐	☐
17. Increased sex drive.	☐	☐	☐	☐	☐
18. Tiredness.	☐	☐	☐	☐	☐
19. Muscle stiffness.	☐	☐	☐	☐	☐
20. Palpitations.	☐	☐	☐	☐	☐
21. Difficulty in remembering things.	☐	☐	☐	☐	☐
22. Losing weight.	☐	☐	☐	☐	☐
23. Lack of emotions.	☐	☐	☐	☐	☐
24. Difficulty in achieving climax.	☐	☐	☐	☐	☐
25. Weak fingernails.	☐	☐	☐	☐	☐
26. Depression.	☐	☐	☐	☐	☐

	NOT AT ALL	VERY LITTLE	A LITTLE	QUITE A LOT	VERY MUCH
27. Increased sweating.	☐	☐	☐	☐	☐
28. Mouth ulcers.	☐	☐	☐	☐	☐
29. Slowing of movements.	☐	☐	☐	☐	☐
30. Greasy skin.	☐	☐	☐	☐	☐
31. Sleeping too much.	☐	☐	☐	☐	☐
32. Difficulty passing water.	☐	☐	☐	☐	☐
33. Flushing of face.	☐	☐	☐	☐	☐
34. Muscle spasms.	☐	☐	☐	☐	☐
35. Sensitivity to sun.	☐	☐	☐	☐	☐
36. Diarrhoea.	☐	☐	☐	☐	☐
37. Over-wet or drooling mouth.	☐	☐	☐	☐	☐
38. Blurred vision.	☐	☐	☐	☐	☐
39. Putting on weight.	☐	☐	☐	☐	☐
40. Restlessness.	☐	☐	☐	☐	☐
41. Difficulty getting to sleep.	☐	☐	☐	☐	☐
42. Neck muscles aching.	☐	☐	☐	☐	☐

	NOT AT ALL	VERY LITTLE	A LITTLE	QUITE A LOT	VERY MUCH
43. Shakiness.	☐	☐	☐	☐	☐
44. Pins and needles.	☐	☐	☐	☐	☐
45. Painful joints.	☐	☐	☐	☐	☐
46. Reduced sex drive.	☐	☐	☐	☐	☐
47. New or unusual skin marks.	☐	☐	☐	☐	☐
48. Parts of body moving of their own accord e.g. foot moving up and down.	☐	☐	☐	☐	☐
49. Itchy skin.	☐	☐	☐	☐	☐
50. Periods less frequent.	☐	☐	☐	☐	☐
51. Passing a lot of water.	☐	☐	☐	☐	☐

Appendix 6

Chlorpromazine Equivalence of the First and Second Generation Antipsychotic Drugs (adapted from Gardener, 2010)

Medication		Equivalent to 100mg CPZ
SGA	Amisulpride	116.7
	Apripirazole	5
	Clozapine	66.7
	Olanzapine	3.3
	Paliperidone	1.50
	Quetiapine	125
	Risperidone / Risperidone Consta†	1
	Sertindole	3.33
	Ziprasidone	26.7
FGA	Chlorpromazine	100
	Clopenthixol	10
	Fluphenazine	2
	Flupenthixol	1.67
	Haloperidol	1.66
	Pericyazine	8.33
	Perphenazine	5
	Thiothixene	5
	Trifluoperazine	3.33
	Zuclopenthixol	8.33

*Total dose in CPZ equiv mg = (dose medication per day x 100) / (CPZ equiv per 100mg).

Appendix 7

Socio-Demographic Questionnaire

General Information

1. Are you currently in a relationship? ☐ No ☐ Yes

   If yes: (a) Is this relationship with the father of your baby? ☐ No ☐ Yes

   (b) How long have you been in this relationship?

   ☐ < 3 months
   ☐ 3-6 months
   ☐ 6-12 months
   ☐ 1-2 years
   ☐ 2-3 years
   ☐ > 3 years

2. Marital status:

   ☐Married /de-facto
   ☐ Never married /de-facto
   ☐ Separated
   ☐ Divorced
   ☐ Widowed

3. Household (list all persons currently living in household *including yourself*)

Name	Relationship (to you)	Gender	Age

4. Do you have any children not living with you? ☐No ☐ Yes

Name	Gender	Age	Living with:
			☐Other family member ☐foster care ☐other
			☐Other family member ☐foster care ☐other
			☐Other family member ☐foster care ☐other
			☐Other family member ☐foster care ☐other
			☐Other family member ☐foster care ☐other

5. What type of home do you live in?

☐ Separate house ☐ Flat/Unit/Apartment ☐ Semi Detached ☐ other (describe)

6. Do you:

☐ Own your home outright ☐ Rent(private) ☐ Rent(Govt) ☐ Have Mortgage

7. What country were you born in? ______________________

8. What country was your partner born in? _________________

9. Do you speak a language other than English at home? ☐ No ☐ Yes (*specify*)

   ____

10. What was the last year you completed at school?

    ☐ School year 12 or equivalent
    ☐ School year 11 or equivalent
    ☐ School year 10 or equivalent
    ☐ School year 9 or equivalent
    ☐ None of the above

11. Have you done any study other than high school? ☐ No ☐ Yes

    (a) If yes:

    ☐ Postgraduate degree
    ☐ Graduate degree/certificate
    ☐ Bachelor Degree
    ☐ Advanced diploma/diploma
    ☐ Certificate
    ☐ Other ____________________

12. What was the last year your partner finished at school?

    ☐ School year 12 or equivalent
    ☐ School year 11 or equivalent
    ☐ School year 10 or equivalent
    ☐ School year 9 or equivalent
    ☐ None of the above

13. Has your partner done any study other than at high school? э No э Yes

    (a) If yes:

    ☐ Postgraduate degree
    ☐ Graduate degree/certificate
    ☐ Bachelor Degree
    ☐ Advanced diploma/diploma
    ☐ Certificate
    ☐ Other ____________________

14. What was your occupation before giving birth?

- ☐ In full-time work
- ☐ In part-time work
- ☐ Casual work
- ☐ Currently on sickness/disability benefit
- ☐ Unemployed and seeking work
- ☐ Full-time study
- ☐ Full-time home duties
- ☐ Permanently retired
- ☐ On maternity leave

Returning to work: ____________

- ☐ Other ____________________

15. What is your partner doing at the moment?

- ☐ In full-time work
- ☐ In part-time work
- ☐ Casual work
- ☐ Currently on sickness/disability benefit
- ☐ Unemployed and seeking work
- ☐ Full-time study
- ☐ Full-time home duties
- ☐ Permanently retired
- ☐ On paternity leave

Returning to work: ____________

- ☐ Other ____________________

16. What is your main source of income?

- ☐ Wages/salary earned by you or your partner
- ☐ Government, pension or allowance
- ☐ Child support or maintenance from ex-partner
- ☐ Other

Please specify:________________________

Health Information

17. In general, would you say your health is:

☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

18. Do you:

☐ Smoke? *How many /day?* ____

☐ Drink alcohol? *How many/day or week?* ____________________________________

☐ Drink caffeinated drinks? *How many/day or week?* __________________________
(incl. coffee/tea/cola/energy drinks, etc)

19. Do you have any long term health problems (such as asthma, epilepsy or diabetes?)

☐ No ☐Yes: *Please specify:*______________________________

20. Do you have any allergies? ☐ No ☐ Yes: *Please specify:*____________________

21. Are you currently taking any medication? ☐ No ☐ Yes

(a) If yes:

Please list any medications you currently take, daily doses (mg) and how long you have been taking each medication (months)

Medication	**Dose**	**Months**	**Medication**	**Dose**	**Months**
	mg			mg	
	mg			mg	
	mg			mg	

22. Have you suffered any illnesses / operations?

(a) If yes:

Illness/Operation	**Year**
1.	
2.	
3.	
4.	
5.	

23. Do you, or have you ever, suffer(ed) from a mental illness? ☐ No ☐ Yes

(a) If yes, please specify: ______________________________
(b) When did the first episode occur? ____________________

24. Does your partner, or has your partner ever, suffer(ed) from a mental illness?

☐ No ☐ Yes

(a) If yes, please specify: ________________________
(b) When did the first episode occur? _______________
(c) Does (or did) your partner take medication for this?

☐ No ☐ Yes

If yes, please specify: __________________________

25. Do you have any regular interests/hobbies/activities? ☐ No ☐ Yes

If yes, please specify:

____

____

26. Are you currently able to participate in these activities:

☐ As much as always
☐ Not as much as I would like
☐ Not interested
☐ Unable to participate

Please elaborate:

____

____

27. Are you currently able to participate in day-to-day chores and activities:

☐ As much as always
☐ Not as much as I would like
☐ Not interested
☐ Unable to participate

Please elaborate:

____

____

Obstetric Information

28. What was your baby's birthweight? ______________________

29. How many weeks pregnant were you when your baby was born?_________

30. Was this baby planned? ☐ No ☐ Yes

31. Have you used any form of birth control in the past or at present?

    ☐ No ☐ Yes

    If yes:
    (a) Type of contraception: ____________________________________
    (b) Length of time using this method: ____________________________

32. How was your baby conceived? ☐ Natural ☐ Assisted

33. What type of delivery did you have?

    ☐ Vaginal
    ☐ Vaccuum/forceps
    ☐ Breach
    ☐ C-section (elective)
    ☐ C-section (emergency)

34. How stressful for you was your delivery?

    ☐ Not at all
    ☐ Mild
    ☐ Moderate
    ☐ Intense
    ☐ Extreme

35. What did you use for pain management?

    ☐ Nothing (natural)
    ☐ Pethidine
    ☐ Epidural
    ☐ Other
    Please describe: __________________________
    ____

36. How long were you and your baby in hospital after the birth? ____________

37. Did your baby spend any time in intensive care? ☐ No ☐ Yes

(a) If yes: how long? __________

38. During your pregnancy, did you have:

- ☐ Diabetes
- ☐ High blood pressure
- ☐ Any other physical health problems:

*Please describe:*____________________________

- ☐ Problems with stress, anxiety or depression

39. Does your baby have a twin brother or sister? ☐ No ☐ Yes

40. How have you fed your baby?

- ☐ Breast
- ☐ Formula
- ☐ Mixed

(a) Did you choose to feed your baby this way? ☐ No ☐ Yes
(b) If breastfed, for how long?

- ☐ Still having breastmilk
- ☐ Up to 6 wks
- ☐ 6 wks to 3 mths
- ☐ 3 mths to 6 mths
- ☐ > 6 mths

41. Do/did you have any problems feeding your baby?

- ☐ None
- ☐ Mild
- ☐ Moderate
- ☐ Severe

42. In general, how would you say your baby's health is?

- ☐ Excellent
- ☐ Very good
- ☐ Good
- ☐ Fair
- ☐ Poor

43. Has your baby ever been diagnosed with a medical, behavioural or other health condition? ☐ No ☐ Yes

(a) If yes, please describe:

____

____

44. Does/did your baby have colic or reflux?

- ☐ None
- ☐ Mild
- ☐ Moderate
- ☐ Severe

Appendix 8

Camberwell Assessment of Need for Mothers (CAN-M) (Howard & Hunt, 2008)

i. List of Domains:

1. Accommodation
2. Food
3. Looking after the home
4. Self care
5. Daytime activities
6. General physical health
7. Pregnancy care
8. Sleep
9. Psychotic symptoms
10. Psychological distress
11. Information
12. Safety to self
13. Safety to child and others
14. Substance misuse
15. Company
16. Intimate relationships
17. Sexual health
18. Violence and abuse
19. Practical demands of childcare
20. Emotional demands of childcare
21. Basic education
22. Telephone
23. Transport
24. Budgeting
25. Benefits
26. Language, culture and religion

p.t.o.

ii. Sub-scores generated for the current study:

1. Total Level of Need

This was the sum of level of need indicated on each of the domains of need.

Response options included:

0 no need
1 met need
2 unmet need

2. Help Provided by Family

Calculated by summing the level of family need indicated on each of the 26 domains of functioning.

Response options included:

0 none
1 low help (occasional)
2 moderate help (weekly)
3 high help (daily)

3. Help Received from Services

Calculated by summing the level of service intervention that was provided for each area of functioning.

Response options included:

0 none
1 low help (occasional)
2 moderate help (weekly)
3 high help (daily)

4. Help Needed from Services

Calculated by summing the level of service intervention that was needed for each area of functioning.

Response options included:

0 none
1 low help (occasional)
2 moderate help (weekly)
3 high help (daily)

Appendix 9

Item Content of World Health Organisation Quality of Life questionnaire – Brief Form (WHOQOL-BREF) Domains (Murphy et al., 2000)

Domain	Item content
Physical health	Activities of daily living, dependence on medical treatment, energy and fatigue, mobility, pain and discomfort, sleep, work capacity.
Psychological health	Bodily image and appearance, negative feelings, positive feelings, self-esteem, spirituality, concentration.
Social relationships	Personal relationships, social support, sexual activity.
Environment	Finances, physical safety, access to health services, home environment, opportunities to acquire new information, leisure activities, physical environment, transport.

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Infant Caregiving Assessment Scales

DRAFT ONLY

Assessment Procedure

In a naturalistic setting, the mother is filmed as she completes the core tasks of caring for her infant. To administer assessment, instruct participants as below. Film task completion and rate retrospectively. Examine and rate video footage in close consultation with the flowcharts, observing the criteria assigned to each of the anchor points. During rating, caregiving tasks are observed freely at first, then again with reference to the flowcharts. There is space after each flowchart to record any mentalisations and attributions that are verbalised by the mother during each caregiving task. To monitor and maintain your reliability, have an independent clinician re-rate around 20% of your evaluations.

Example:

Introductory Dialogue

Thanks for helping us today. We are interested to see how you bathe, dress, feed, and change your new baby. There is no right or wrong way to do this, and actually there are probably no two mothers who will do things the same. We have chosen some everyday tasks because we are interested in how different mothers deliver care to their infants. While you are completing each task, try your best to imagine that there is no-one else here except for you and (baby's name). I will help by being as quiet as possible so that you and (baby's name) can work along together as you normally would at home. Take as long as you need to do each task, and if you feel like having a break, just let me know and we can stop at any time. There is no hurry with anything today.

Does this all sound ok so far?

Do you have any questions before we begin?

Ok, let's begin with bathing (baby's name) first, and then dressing him/her straight afterwards. Is this an ok place to start with you?

Mother gives baby a bath and dresses him/her afterwards

Now let's move on to feeding your baby.

Mother feeds baby

Ok, that's great thanks (mother's name). The final thing we'd like you to do today is change (baby's name)'s nappy.

Mother changes baby's nappy

Notes: 1. It is important to let the mother know that your silence throughout filming is for her benefit. This way she will not worry that something is wrong with her performance, and will be less likely to feel compelled to converse with you while being filmed. 2. Many mothers will feel pressured to complete tasks as quickly as possible unless you specify that this is not necessary. It is therefore important to let the mother know that there is no time limit; she is not to hurry through the tasks. 3. If the mother and her baby are more naturally ready to feed rather than bathe first, change before feeding, or require a lapse in time before commencing a feed, it is important that you are flexible in your approach to assessment. This will enhance the ecological validity of your observation and assessment.

Administration

Step 1. Build rapport with the mother. Show interest and kindness, and communicate your intention to work collaboratively towards achieving an enjoyable parenting experience for both the mother and her baby.

Step 2. In a naturalistic setting (ideally the home environment) film the mother as she completes the core tasks of caring for her infant. Tasks can be completed in any order, depending upon the needs of the dyad.

Step 3. Back at your place of work, review the footage freely a first time before commencing the rating process.

Step 4. Review the footage a second time in consultation with the task-specific flowchart inventories. This will help to focus your attention onto the mother's *task-related* capacity (without clinical bias). Rate the checklists as you go along, adding extra information where needed.

Step 5. Review the completed checklists, paying attention to ordering of sub-tasks and any difficulties that the mother encountered. Think about the dimensions and the areas of parenting from which task-related difficulty originates. Record any mentalisations and attributions in the spaces provided.

Step 6. In close consultation with rating criteria, score the mother's overall capacity on each of the global dimensions.

By necessity, assessment with the INCAS is a dedicated process. Dimension scores yield information that is rich and fine-grained, a must for high-needs dyads. Identify and make a note of dimensions of strength, as well as those of limitation. Optimum utility is derived from consideration of caregiving capacity at the level of INCAS dimensions. While interesting for research purposes, INCAS Total scores are of limited clinical value for work with individual dyads.

There will undoubtedly be a number of ways to utilise this instrument in your day-to-day practice. Above all however, it is intended that you do so in a way that promotes a non-threatening and productive therapeutic alliance.

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Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

DRAFT ONLY

Infant Caregiving Assessment Scales

Flowcharts

Date ________________________________

Participant ____________________________

Time ________________________________

Location _____________________________

Administrator _________________________

Rater ________________________________

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Steps for Bathing a New Infant:

Present	Absent	Step
☐	☐	Make sure the room is a comfortable temperature.
☐	☐	Gather supplies in advance. Set out a washer, towel, nappy and clothing near the bath.
☐	☐	Add enough water for a shallow bath
☐	☐	Test the water temperature (use your wrist, elbow or a thermometer). Water should be around 36°C.
☐	☐	When the bath is ready, undress baby.
☐	☐	Supporting the head, neck and body, lower baby into the bath, keeping his/her head out of the water.
☐	☐	Using a cup, cloth or your free hand, wet the baby's body.
☐	☐	Gently clean face with a soft washcloth. Clean eyelids, wiping from inner eye to outer eye.
☐	☐	Next, clean neck and body, remembering creases and folds behind ears, around neck, under arms, etc.
☐	☐	Clean bottom last, remembering creases and folds around the legs.
☐	☐	If washing hair today, gently massage water into the hair and scalp. Rinse.
☐	☐	Supporting head, neck and body, lift baby out of the bath.
☐	☐	Place baby in a towel. Dry gently behind the ears and in the skin folds so that no excess moisture is left behind.

Interaction
Stay mindful of your baby's bids for social engagement, meeting eye contact and acknowledging any vocalisations along the way.

Protection & Safety
Line the bottom of the bath with a cloth to prevent baby from slipping.

Holding
Keep baby steady with a gentle, firm hold that supports the head, neck and body.

Emotion Regulation
Try to keep the baby warm during bathing with a wet cloth or by pouring water over the exposed tummy.

Focus
Never leave baby unattended in the bath.

Empathy
Avoid pouring water into face and eyes where possible.

Emotion Regulation
Cover baby's head for warmth. Where possible during drying, keep the baby's body covered.

DRAFT ONLY

Comments/additional information:

____

____

____

____

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Mental state comments during bathing

Infant-directed mental state comment	Appropriate?	
	Yes	No

DRAFT ONLY

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Steps for Dressing a New Infant:

Present	Absent	Step
☐	☐	Prepare by setting out a clean nappy, any creams or powders as needed, baby wipes, a singlet and bodysuit .
☐	☐	First put on the nappy (refer to appropriate flowchart).
☐	☐	Next put the singlet on. With baby lying flat on the change table, stretch the neck of the singlet open. Supporting the head, put the singlet on from the back, avoiding the face as you pull the front down over the head.
☐	☐	Gently thread each arm through the arm holes.
☐	☐	Lift baby off change table and hold securely in one arm against your body.
☐	☐	Lay the opened bodysuit on the changing surface with your free hand.
☐	☐	Supporting the head and back, gently replace baby onto opened suit.
☐	☐	Gently thread arms and legs through sleeves and feet of the suit. Do not tug on baby's limbs. Instead, shuffle the sleeves and legs along the arms and legs until they are in place.
☐	☐	Fasten studs or buttons.
☐	☐	If the bodysuit does not have feet built in, cover baby's feet with socks or soft footwear if the weather is cool.

Focus
Never leave baby unattended on the change table.

Protection
If you must turn your back, do so only while holding one hand on baby's body.

Empathy & Emotion Regulation
If baby becomes distressed it can help to take the time to pause, lift and cuddle your baby until soothed.

Interaction
Stay mindful of your baby's bids for social engagement, meeting eye contact and acknowledging any vocalisations along the way.

DRAFT ONLY

Comments/additional information:

____

____

____

____

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Mental state comments during dressing

Infant-directed mental state comment	Appropriate?	
	Yes	No

DRAFT ONLY

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Steps for Breastfeeding a New Infant:

Present	Absent	Step
☐	☐	Ensure hands are clean.
☐	☐	Place a towel or cloth nappy nearby for easy access during feeding.
☐	☐	Position yourself in a way that is safe and comfortable for feeding (ie; not 'hunching' forward).
☐	☐	Position baby close to your body with head, shoulders and hips facing you. Ensure that the baby's head is in close to your breast.
☐	☐	Brush baby's cheek to encourage the 'rooting reflex', ie; mouth to open and head to turn in.
☐	☐	When the baby's mouth opens, pull closer in to the breast and commence feeding.
☐	☐	Allow baby to feed on first side until active sucking has stopped.
☐	☐	Support baby's body in either a sitting position on your lap, or against your body over your shoulder.
☐	☐	Gently rub and/or pat baby's back so that excess wind can be expelled.
☐	☐	When your baby is ready, position on your other side and recommence feeding.
☐	☐	Allow baby to feed until active sucking has stopped.
☐	☐	As before, support the baby's body in either a sitting position on your lap, or against your body over your shoulder.
☐	☐	Gently rub and/or pat baby's back so that excess wind can be expelled.

Interaction
Stay mindful of your baby's bids for social engagement, meeting eye contact and acknowledging any vocalisations along the way.

Protection & Competence
Ensure that baby's entire body length is supported, with the spine and head in line.

Competence
For effective latching and milk flow, most of the areola should be in the baby's mouth.

Interaction
To ensure that sufficient calories are taken in, you can gently stroke or (non-intrusively) vocalise to keep your baby engaged in feeding.

Empathy
Do not force baby to drink when he/she repeatedly turns his/her head or otherwise indicates that a break is required. Likewise, do not interrupt active sucking unless there is a problem with latching. Detach baby as below, do not pull straight off the breast.

Competence
To correct an uncomfortable or awkward attachment, insert your little finger into the corner of baby's mouth and manoeuvre between the gums. Gently remove the baby's mouth from your breast.

DRAFT ONLY

Comments/additional information:

____

____

____

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Mental state comments during breastfeeding

Infant-directed mental state comment	Appropriate?	
	Yes	No

DRAFT ONLY

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Steps for Bottle-feeding a New Infant:

Present	Absent	Step
☐	☐	Ensure hands are clean.
☐	☐	Gather together a sterile bottle.
☐	☐	Pour water into the bottle.
☐	☐	Add formula to water.
☐	☐	Warm formula.
☐	☐	Pull the teat through the ring and screw ring onto bottle.
☐	☐	Shake well.
☐	☐	Test the temperature of the heated formula.
☐	☐	Place a towel or cloth nappy nearby for easy access during feeding.
☐	☐	Position yourself in a way that is safe and comfortable for feeding (ie; not 'hunching' forward).
☐	☐	Position baby in close to your body with head, shoulders and hips facing you.
☐	☐	Brush the baby's face to encourage the mouth to open and to turn in.
☐	☐	When the baby's mouth opens, pull closer in and commence feeding.
☐	☐	Allow baby to feed until active sucking has stopped.
☐	☐	During natural pauses in feeding, support baby's body in either a sitting position on your lap, or against your body over your shoulder.
☐	☐	Gently rub and/or pat baby's back so that excess wind can be expelled.
☐	☐	When your baby is ready, re-position and recommence feeding, repeating until adequate milk has been consumed.

Competence & Protection
Approx 1 scoop/60mLs water, or as specified by formula.

Competence
Alternatively, water can be warmed prior to mixing with formula.

Protection & Safety
Let the formula cool if warmer than room temperature.

Competence and Protection
Ensure that baby's entire body length is supported, with the spine and head in line.

Interaction
Stay mindful of your baby's bids for social engagement, meeting eye contact and acknowledging any vocalisations along the way.

Empathy
Do not force baby to drink when he/she repeatedly turns his/her head away or otherwise indicates that a break is required. Likewise, do not interrupt active sucking.

Interaction
To ensure that sufficient calories are taken in, you can gently stroke or (non-intrusively) vocalise to keep your baby engaged in feeding.

Comments/additional information:

____

____

DRAFT ONLY

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Mental state comments during bottle-feeding

Infant-directed mental state comment	Appropriate?	
	Yes	No

DRAFT ONLY

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Steps for Changing a Nappy:

Present	Absent	Step
☐	☐	Make sure the room is a comfortable temperature for your infant.
☐	☐	Ensure the changing surface is clean, flat , comfortable and safe.
☐	☐	Prepare by setting out a bin/plastic bag, clean nappy, baby wipes & any creams or powders as needed, all within arm's reach.
☐	☐	Lie baby down on the surface with a towel or mat between baby and surface for comfort and protection.
☐	☐	Undress baby's bottom half and unfasten the nappy.
☐	☐	Gently take hold of the baby's ankles with one hand (with your finger between the ankles) and raise them just enough to lift the baby's bottom off the nappy.
☐	☐	Fold the nappy closed to prevent any spillage.
☐	☐	Place soiled nappy aside (ideally in your plastic bag or bin at arms reach).
☐	☐	With ankles still raised, gently clean baby using damp wipes. Discard used wipes as you go along.
☐	☐	Open a clean nappy and position beneath baby's (clean) bottom.
☐	☐	If needed, apply cream and/or powder.
☐	☐	Fold the front flap up, tuck it firmly (but not too tightly) around baby's waist and secure each tab.

Focus & Protection
Never leave baby unattended on the change table.

Protection
If you must turn your back, do so only while holding one hand on baby's body.

Interaction
Stay mindful of your baby's bids for social engagement, meeting eye contact and acknowledging any vocalisations along the way.

Competence
Open nappy by unfolding the front flap towards you. Baby's bottom should still be resting on the back of the nappy.

Empathy & Emotion Regulation
If baby becomes distressed it can help to take the time to pause, lift him or her off the changetable and cuddle until soothed (where safe & practical).

Protection
Wipe from front to back to prevent urinary tract infections. Clean area thoroughly, remembering crevices and folds around the legs.

Competence
Ensure that nappy is around the right way. Place flap with tabs underneath baby's bottom.

DRAFT ONLY

Comments/additional information:

____

____

____

____

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Mental state comments during nappy-change

Infant-directed mental state comment	Appropriate?	
	Yes	No

DRAFT ONLY

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Infant Caregiving Assessment Scales

&

Rating Criteria

DRAFT ONLY

Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Emotional Caregiving Dimensions (e)

e1_Affection

0 Mother is cold and/or hostile toward infant during task completion.
1 Mother shows lack of affect toward infant during task completion.
2 Mother exhibits adequate warmth toward infant during task completion.
3 Mother is warm and at times affectionate toward infant during task completion.
4 Warmth, affection and love are exhibited by mother toward infant at all times during task completion.

0 1 2 3 4

e2_Interaction

0 Infant's bids for interaction are consistently ignored or missed by the mother. The mother either attempts no engagement, or where she does, it appears intrusive, unwanted and/or unpleasant for the infant.
1 Infant's bids for interaction are often ignored or missed by the mother. The mother either engages infrequently, or where engagement is frequent, it often appears intrusive, unwanted and/or unpleasant for the infant.
2 Infant's bids for interaction are mostly met by the mother. The mother engages adequately with her infant, and her contact rarely appears intrusive, unwanted and/or unpleasant for the infant.
3 Infant's bids for interaction are consistently met by the mother. The mother engages frequently with her infant, and her contact seldom appears misattuned.
4 Infant's bids for interaction are consistently met by the mother. The mother engages frequently with her infant, and her contact never appears intrusive, unwanted or unpleasant for the infant. Infant is stimulated at an optimum level throughout caregiving.

0 1 2 3 4

e3_Empathy

0 Mother is consistently rough and/or objective in her treatment of infant during task completion, appearing unconcerned with (or unaware of) the infant's subjective experience.
1 Mother is at times rough and/or objective in her treatment of infant during task completion, appearing only vaguely concerned with (or aware of) the infant's subjective experience.
2 Mother appears aware of infant's fragility and attempts to handle him or her gently during task completion. Any rough or uncomfortable treatment occurs as a result of physical error rather than emotional indifference to the infant's subjective experience.
3 Mother is gentle and respectful of infant for most of the time throughout task completion, appearing aware of and concerned for the infant's subjective experience.
4 Mother is gentle and respectful of infant at all times during task completion, demonstrating awareness of and concern for the infant's subjective experience. Mother at times takes extra measures to ensure that her infant is comfortable and happy throughout caregiving.

0 1 2 3 4

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Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

e4_Adaptability

0 Mother is largely rigid in her approach to task completion, displaying inadequate responsivity to unexpected events or changing needs of the infant.

1 Mother is somewhat rigid in her approach to task completion, displaying limited responsivity to unexpected events or changing needs of the infant.

2 Mother is able to respond adequately to most unexpected events or changing needs of the infant during task completion.

3 Mother shows flexibility in her approach to task completion, responding well to unexpected events and changing needs of the infant.

4 Mother is spontaneous, flexible and responsive in her approach to task completion, adjusting her actions to most unexpected events and changing needs that occur during task completion.

0 1 2 3 4

e5_Emotion Regulation

0 Adverse infant states are either ignored or not perceived by the mother, and infant is repeatedly overwhelmed and/or distressed throughout task completion.

1 Adverse infant states are not always perceived by the mother. Responding is inconsistent, and largely ineffective when it occurs.

2 Most adverse infant states are perceived by the mother, but are not correctly acted upon for the most part, or where correctly acted upon, soothing is not always performed promptly or effectively such that arousal is settled.

3 Adverse infant states are perceived by the mother and acted upon in a timely and effective fashion, such that infant dysregulation is minimal throughout task completion.

4 Mother guards against adverse infant states with mindful planning and effective and timely management where problems arise. Infant is rarely if ever dysregulated throughout task completion as a result of the mother's actions.

0 1 2 3 4

e6_Mindedness

0 There is no mental state language, or when used, almost all of the mother's mental state language inappropriately reflects the infant's inner states, experiences and processes. Where mental state language is used, the infant's mind is not only misread by the mother, but is at times also distorted.

1 There is almost no mental state language, or when used, much of the mother's mental state language inappropriately reflects the infant's inner states, experiences and processes.

2 Some of the mother's vocalisation consists of mental state language. This mental state language at most times appropriately reflects the infant's inner states, experiences and processes.

3 Much of the mother's vocalisation consists of mental state language. This mental state language at most times appropriately reflects the infant's inner states, experiences and processes.

4 Most of the mother's vocalisations consist of mental state language. This mental state language seems to appropriately reflect the inner states, experiences and processes of the infant.

0 1 2 3 4

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Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Instrumental Caregiving Dimensions (i)

i1_Protection

0 Mother fails to protect infant from harm and ill health. There are one or more instances whereby a clear risk of harm to the infant is apparent in conjunction with mother's behaviour.

1 Some protective behaviours are observed, however infant's safety and/or health are occasionally at risk in conjunction with mother's behaviour.

2 Mother adequately protects infant from harm and ill health. Mother's behaviour throughout caregiving does not compromise safety and/or health of the infant.

3 Mother displays a good ability to keep infant safe and healthy. Protective behaviours are often apparent throughout caregiving.

4 Mother demonstrates a superior ability to keep infant safe and healthy at all times. Protective behaviours are consistently apparent throughout caregiving.

0 1 2 3 4

i2_Focus

0 Mother exhibits distractibility and an inability to remain focused on either the infant or the task at hand. There is clear risk to the infant in association with this lack of focus.

1 Mother somewhat disorganised in attending to either the infant or the task at hand; easily distracted. There is a potential for risk to the infant in association with insufficient focus.

2 Sufficient attention and focus are present during task completion. There does not appear to be any risk to the infant as a result of insufficient focus.

3 Mother consistently attends to the infant and tasks at hand. The infant's safety is enhanced as a result.

4 Mother is perceptive and aware at all times, displaying vigilant attention to the infant and tasks. The infant's safety is enhanced as a result.

0 1 2 3 4

i3_Competence

0 Mother does not have sufficient knowledge and/or skills to complete the caregiving tasks adequately.

1 Mother displays some knowledge and/or skill when undertaking tasks, however not enough for adequate caregiving.

2 Mother possesses the knowledge and skills required to complete the caregiving tasks adequately.

3 Mother exhibits knowledge and skill, completing caregiving tasks at a good standard.

4 Mother completes task extremely well, showing strong knowledge, skill, and direction while doing so.

0 1 2 3 4

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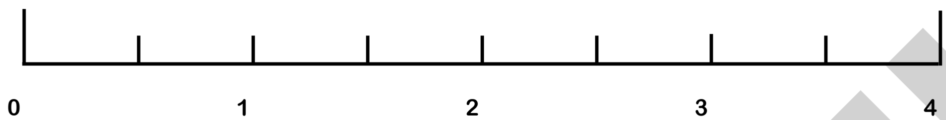
Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

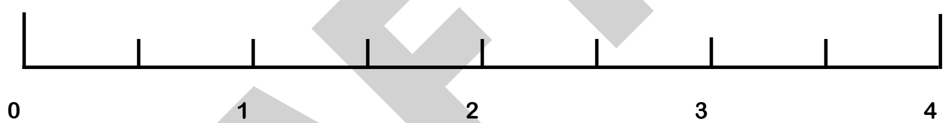
i4_Provision

- **0** Mother is unable to provide for the infant's basic physical needs.
- **1** Mother is able to provide for some, but not all, of the infant's basic physical needs.
- **2** Mother is able to provide for all of the infant's basic physical needs.
- **3** Mother more than adequately provides for the infant's basic physical needs, and has one or more provisions which facilitate extra stimulation, comfort, and/or enjoyment throughout caregiving.
- **4** Mother is able to provide for all of the infant's basic physical needs and has many additional provisions which facilitate extra stimulation, comfort, and/or enjoyment throughout caregiving.



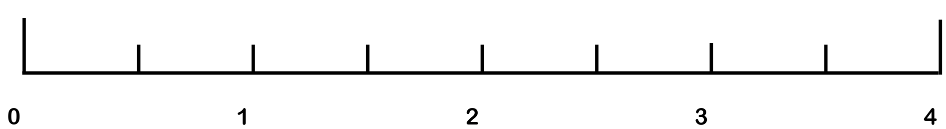
i5_Diligence

- **0** Mother shows a lack of commitment towards completing the caregiving tasks adequately, employing insufficient effort throughout. Tasks are as a result not completed at a sufficient standard.
- **1** Mother appears somewhat committed to completion of the tasks, however more effort is needed in order to complete tasks at a good-enough standard.
- **2** Tasks completed with satisfactory commitment and effort. Tasks are as a result completed at a good-enough standard or where not good-enough, completed inadequately due to insufficient skill.
- **3** There is evidence of commitment to successful task completion, with much effort employed throughout caregiving in order to 'get things right'. Tasks are as a result completed at a good standard or where not good-enough, completed inadequately due to insufficient skill.
- **4** Tasks are completed conscientiously by the mother, with meticulous care and effort afforded throughout in order to 'get things right'. Tasks are as a result are completed at an excellent standard or where not good-enough, completed inadequately due to insufficient skill.



i6_Holding

- **0** Mother's physical coordination and control is poor throughout task completion, resulting in incorrect, uncomfortable, or unsafe handling of the infant.
- **1** Mother demonstrates some physical coordination and control, however handling of the infant and/or control throughout task completion remains incorrect, uncomfortable, or unsafe for the infant.
- **2** Mother exhibits adequate physical coordination and control throughout task completion, and handling is correct, safe, and at most times comfortable for the infant.
- **3** Mother exhibits good physical coordination and control throughout task completion, and handling is correct, safe, and at most times comfortable for the infant.
- **4** Mother exhibits superior physical coordination and control throughout task completion, and handling is correct, safe, and at all times comfortable for the infant.



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Appendix 10

The Infant Caregiving Assessment Scales (INCAS)

Infant Caregiving Assessment Scales

Scoring

Emotional Domain	**(e)**	
Instrumental Domain	**(i)**	
INCAS Total Score	**(e+i)**	

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Appendix 11

Coefficient Alphas for the Nursing Child Assessment Feeding Scales (NCAST-F) (Barnard, 1978) Subscale and Full Scale Scores in the Study

NCAST-F scale	α
Caregiver scales	
Sensitivity to cues	.74
Response to distress	.81
Socio-emotional growth fostering	.49
Cognitive growth fostering	.40
Caregiver total	**.86**
Infant scales	
Clarity of cues	.40
Responsiveness to caregiver	.49
Infant total	**.64**
Caregiver/Infant Total	**.86**

Appendix 12

Rating and Scoring Procedure for the Mind-Mindedness (MM) Measure (adapted from Meins et al., 2002)

Rating

1. Video footage is viewed and transcribed verbatim.

2. From the transcript, the total number of comments made by the mother are quantified and recorded.

Comments are classified as a discrete sound, single word, or sentence. For example, the following utterances each contain two comments:

"Ball. Ball"
"That's a nice ball. Do you like the ball?"

3. Each comment is categorised according to whether or not it involves mental state language. Comments containing a term which refers to the internal state of a person are classified as mental state language.

Mental state language is defined according to the following criteria set by Meins (Meins, Fernyhough, Fradley, & Tuckey, 2001) for mind-related comments:
Comments on mental states, such as knowledge, thoughts, desires, and interests. For example:

"You know *what that is. It's a ball"*
"I think *that you* think *it's a drum"*

Comments on mental processes, e.g.

"Do you remember seeing a camel?"
"Are you thinking?"

References to the level of emotional engagement, e.g. comments about being *bored, self-conscious*, or *excited*.

Comments on attempts to manipulate people's beliefs, e.g.

"you're joking"
"you're just teasing me"

The mother "putting words into her infant's mouth" so that the mother's discourse takes on the structure of a dialogue between her infant and herself. For example:

"he says, 'I think I've got the hang of that now'"
"she says, 'I'm not interested in him, I've already got one'"

4. Mental states that do not relate to the infant are discarded. Only those comments relating to the mental state of the infant are relevant for scoring purposes.

5. Mental state language relating to the infant is dichotomised as either:

    a. Mental state comments that are <u>appropriate</u> reflections of the infant's mental state, or
    b. Mental state comments that <u>do not</u> appropriately reflect the infant's mind.

Criteria for "appropriate" vs. "inappropriate" mind-related commentary (Meins, et al., 2001) are as follows:
Mind-related comments are considered <u>appropriate</u> when:
The independent coder agrees with mother's reading of her infant's psychological state (e.g. if the mother comments that the infant wants a particular toy, it would be an appropriate comment if the coder concurs that the infant's behaviour is consistent with such a desire).
The comment links the infant's current activity with similar events in the past or future, e.g.
"do you remember seeing a camel?"
(while playing with a toy camel)

The comment serves to clarify how to proceed if there is a lull in the interaction, e.g.

"do you want to look at the posters?"

(after the infant has been gazing around the room, not focussed on any object or activity, for 5 seconds)

Mind-related comments are classed as <u>inappropriate</u> when:

The coder believes that the mother is misinterpreting her infant's psychological state, e.g. stating that the infant is bored with a toy when he/she is still actively engaged in playing with it.

The comment refers to a past or future event that bears no obvious relation to the infant's current activity.

The mother asks what the infant wants to do, or comments that the infant wants or prefers a different object or activity, when the infant is already actively engaged in an activity or is showing a clear preference for a particular object.

The referent of the mother's comment is not clear, e.g. saying "you like that" when the object or activity to which the comment referred is not obvious.

Scoring

Scores for "appropriate" and "inappropriate" mind-related comments were calculated as proportions of the total number of comments produced during the filmed session.

E.g.; 142 comments were made during the session. 13 were appropriate mind-related comments, and 2 were inappropriate mind-related comments.

The 'A' (appropriate) score = .09; the 'I' (inappropriate) score = .01.

Higher scores for appropriate mind-related comments were taken to indicate greater mind-mindedness.

Appendix 13

Parenting Stress Index (PSI)

i. Domains and subscales of the Parenting Stress Index (PSI) (Abidin, 1990)

Domain	Subscales
Child	Distractibility/hyperactivity (DI) Adaptability (AD) Reinforces parent (RE) Demandingness (DE) Mood (MO) Acceptability (AC)
Parent	Competence (CO) Isolation (IS) Attachment (AT) Health (HE) Role restriction (RO) Depression (DP) Spouse (SP)
Life Stress (LS)	

ii. Coefficient alphas for the PSI subscale and scale scores within the current study population

PSI Scale	**α**
Infant scales	
Distractibility/Hyperactivity	.64
Adaptability	.64
Reinforces parent	.49
Demandingness	.69
Mood	.69
Acceptability	.81
Child domain score	**.77**
Mother scales	
Competence	.69
Isolation	.78
Attachment	.61
Health	.70
Role restriction	.78
Depression	.72
Spouse	.53
Parent domain score	**.91**
Total Stress score	**.91**

Appendix 14

Parenting Checklist Questionnaire

1. How would you describe motherhood at present?

☐ No problems / stresses
☐ One or two problems / stresses
☐ Some problems / stresses
☐ Many problems / stresses
☐ Very many problems / stresses

2. Would you say your baby is:

☐ Easy to soothe
☐ Sometimes hard to soothe
☐ Often hard to soothe

3. Has your baby had an illness or an accident that has required medical attention?

Please describe:
____
____
____

4. Have you suffered from an illness or accident?

Please describe:
____
____
____

5. How well do you think you are coping?

☐ Not at all ☐ A little ☐ Fairly well ☐ Very well ☐ Extremely well

6. At present are you having your baby cared for during any part of the week?

☐ No ☐ Yes

If yes:
a) By who? ____
b) How often? ____
c) For what reason(s)? ______________________________________

7. How often are you in contact with your immediate family members?

☐ Daily ☐ Weekly ☐ Fortnightly ☐ Monthly ☐ Rarely

8. How often are you in contact with a supportive friend or neighbour?

☐ Daily ☐ Weekly ☐ Fortnightly ☐ Monthly ☐ Rarely

9. Your relationship:

	Good	Moderate / Variable	Minimal/ Poor	Absent / No contact
How supportive is your partner with domestic duties?	☐	☐	☐	☐
How supportive is your partner in terms of helping with the baby?	☐	☐	☐	☐
How emotionally supportive is your partner?	☐	☐	☐	☐
How confident are you in your ability to confide in your partner?	☐	☐	☐	☐
How would you describe your current relationship with your mother?	☐	☐	☐	☐
How would you describe your current relationship with your father?	☐	☐	☐	☐

10. Have you used any of the following services since having your baby:

☐ Parenting or other phone Help-Line

☐ Parenting courses/programs

☐ Breastfeeding support

☐ Counseling support

☐ Mental health services

☐ Parenting support

☐ Mothers/Parenting groups

☐ Family support

☐ Doctor/GP

☐ Home-visit/outreach service

☐ Drug/alcohol service

☐ Migrant/ethnic support services

☐ Housing services

☐ Employment services

☐ Disability services

☐ Charities (eg. Salvation Army/Anglicare)

☐ Church/religious supports

☐ Centrelink/Family assistance

☐ Childcare/Respite

☐ Legal services

☐ Emergency services

☐ Other health/medical services

☐ Other family support

Please describe any other professional help, support or services that you have received help, advice or support from:

____

____

____

P.T.O.

11. Is your family involved with a child protection agency at the moment (eg; DoCS)?

☐ No ☐ Yes

(a) If yes, what has been happening?
(eg court proceedings, meetings, home visits, respite, parenting program, supervision, out-of-home care)

____
____
____

(b) As a mother, what has this experience been like for you?

____
____
____

12. Has your family been involved with a child protection agency (eg; DoCS) in the past?

☐ No ☐ Yes

(a) If yes, what happened at the time?
(eg court proceedings, meetings, home visits, respite, parenting program, supervision, out-of-home care)

____
____
____

(b) As a mother, what was this experience like for you?

____
____
____

13. Overall, how do you feel about the amount of support or help you get from family, services, or friends?

☐ I don't get any help at all
☐ I don't get enough help
☐ I get all the help I need
☐ I get too much help, people are interfering.

Appendix 15

Bayley Scales of Infant Development

i. Bayley Scales of Infant Development (BSID-III) (Bayley, 2006) Subtests and Item Content

Subtest	Items (n)	Item content
Cognitive	33	Attention Novelty preference and habituation Problem solving Exploration and manipulation Play Object relatedness Concept formation
Receptive communication	24	Auditory acuity Vocabulary development Vocabulary related to morphological development Social referencing Verbal comprehension
Expressive communication	24	Preverbal communications Vocabulary development Morpho-syntactic development
Fine motor	27	Prehension Perceptual-motor integration Motor planning Motor speed Visual tracking Reaching Object manipulation Grasping Functional hand skills
Gross motor	28	Movement of the limbs and torso Static positioning Dynamic movement Balance Motor planning

Items are scored on a standard record form throughout the testing process. Developmental scores are calculated by summing relevant items. Subtest scores are then examined in relation to normed cut-off scores, which indicate the infant's performance, relative to age-matched normal controls.

ii. Internal Consistency of BSID-III Subtest Scores in the Current Population

Subtest	Guttman Split-half coefficient	Cronbach's α
Cognition	.19	.45
Receptive Communication	.67	.45
Expressive Communication	.68	.31
Fine Motor	.80	.76
Gross Motor	.56	.69

Appendix 16

The Strange Situation Procedure (SSP)

i. The Strange Situation Procedure (SSP) (Ainsworth et al., 1978)

Episode	Persons present	Duration	Action(s)
1	Mother Infant Investigator	30 seconds	Investigator introduces mother and infant to play room.
2	Mother Infant	3 minutes	Infant introduced toys. Mother sits in chair. Infant explores.
3	Stranger Mother Infant	3 minutes	Stranger enters, sits next to mother. 1st minute: stranger silent. 2nd minute: converses with mother. 3rd minute: approaches infant and joins in play. After the third minute, mother leaves quietly.
4	Stranger Infant	3 minutes or less[1]	First separation episode. Stranger follows infant's lead.
5	Mother Infant	3 minutes or more[2]	First reunion episode. Mother greets/comforts infant, then tries to settle him/her again in play. Returns to her chair. Stranger leaves quietly. Mother says goodbye and leaves after 3 minutes.
6	Infant alone	3 minutes or less	Second separation episode.
7	Stranger Infant	3 minutes or less	Continuation of second separation. Stranger follows infant's lead.
8	Mother Infant	3 minutes	Second reunion episode. Mother enters, greets infant, then picks him/her up. Stranger leaves unobtrusively. Mother eventually returns to her chair.

Adapted from manual (Ainsworth et al., 1978).

[1] As per the protocol, separations were shortened where the infant showed signs of undue distress.
[2] Reunions were extended where more time was needed for the baby to become reinvolved in play.

ii. SSP Attachment Classifications and Infant Behavioural Patterns

Attachment type	Infant behaviour	Subtypes
Secure (B)	Openly upset when mother leaves; seeks contact with mother upon reunion; relationship looks intimate; balance between exploration and contact with mother.	B1 B2 B3 B4
Insecure avoidant (A)	Appears impervious to separation; attempts to hide distress from mother; avoids engagement upon reunion; contact-seeking is indirect and at times covert; exploration takes precedence.	A1 A2
Insecure resistant (C)	Distress is expressed in exaggerated form; infant appears unable to be soothed during reunions; preoccupation with 'monitoring' mother; exploration restricted.	C1 C2
Insecure Disorganised (D)	Responding is inconsistent, no organised strategy is apparent; reunion behaviour often appears confusing, with reactions such as freezing and collapsing taking place.	D

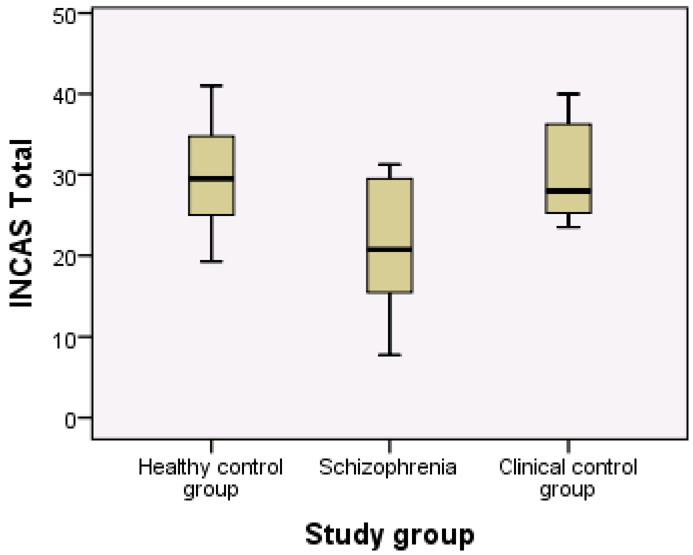
Appendix 17

Factorability and Sampling Adequacy of the INCAS, as Measured by KMO and Bartlett's Tests

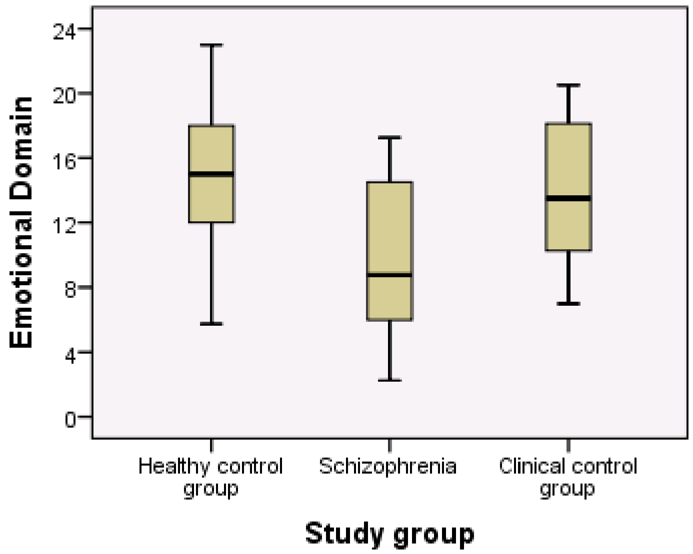
Kaiser-Meyer-Olkin measure of sampling adequacy		0.863
Bartlett's test of sphericity		
	Approx. Chi-square	420.92
	df	66
	Sig.	.00

Appendix 18

Graphical Presentation of Mean INCAS Scores across Study Groups



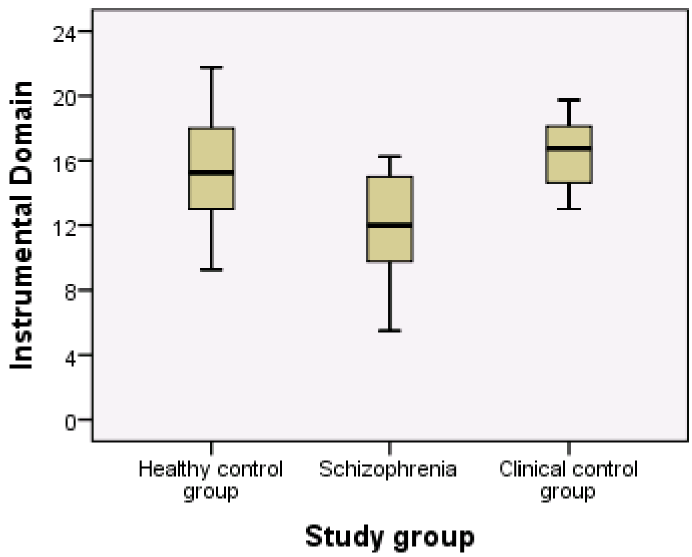
18a. INCAS Total scores across study groups.



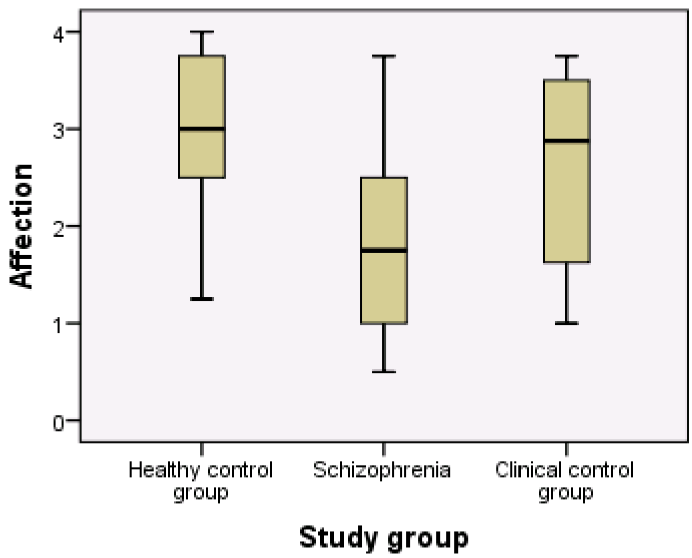
18b. INCAS Emotional Domain scores across study groups.

Appendix 18

Graphical Presentation of Mean INCAS Scores across Study Groups



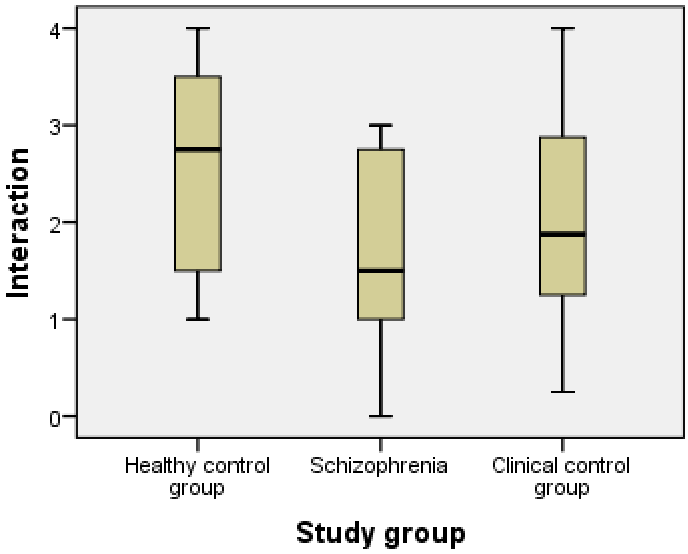
18c. INCAS Instrumental Domain scores across study groups.



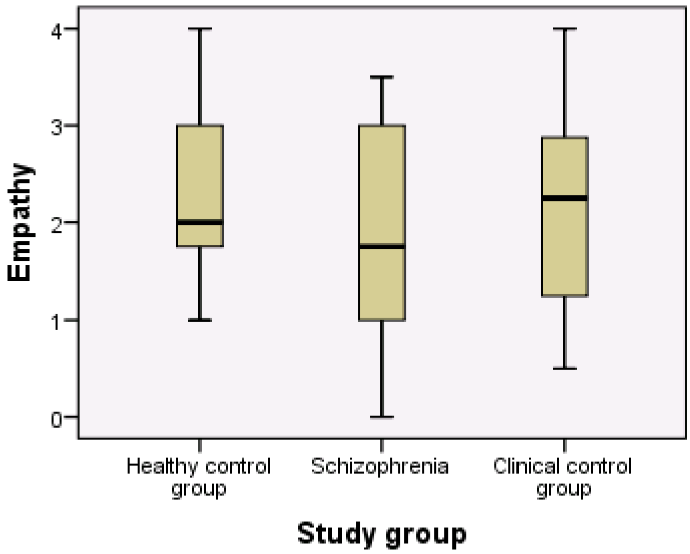
18d. INCAS Affection scores across study groups.

Appendix 18

Graphical Presentation of Mean INCAS Scores across Study Groups



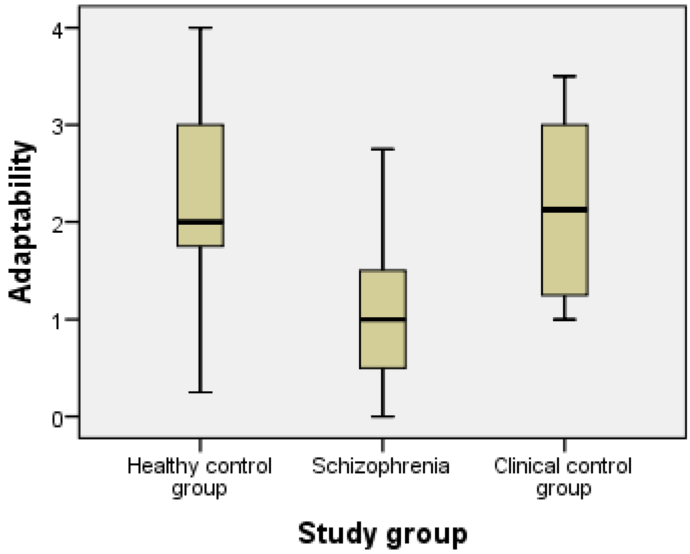
18e. INCAS Interaction scores across study groups.



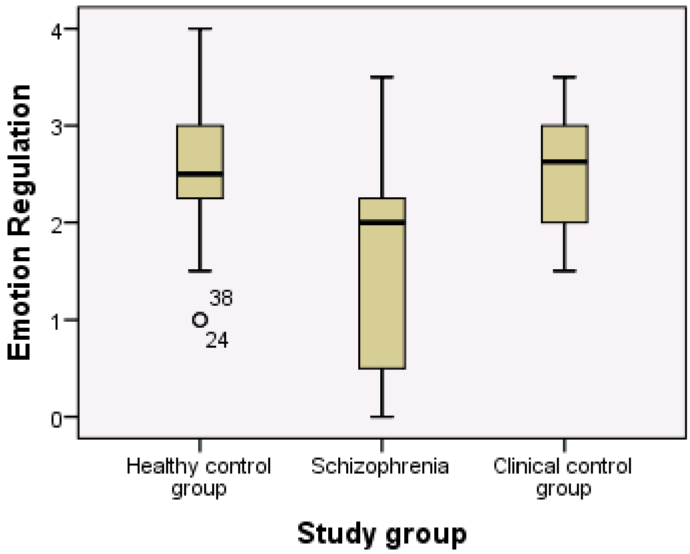
18f. INCAS Empathy scores across study groups.

Appendix 18

Graphical Presentation of Mean INCAS Scores across Study Groups



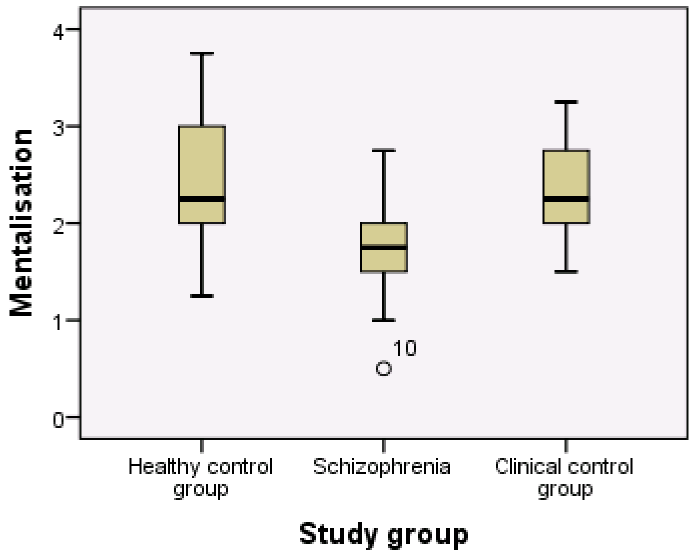
18g. INCAS Adaptability scores across study groups.



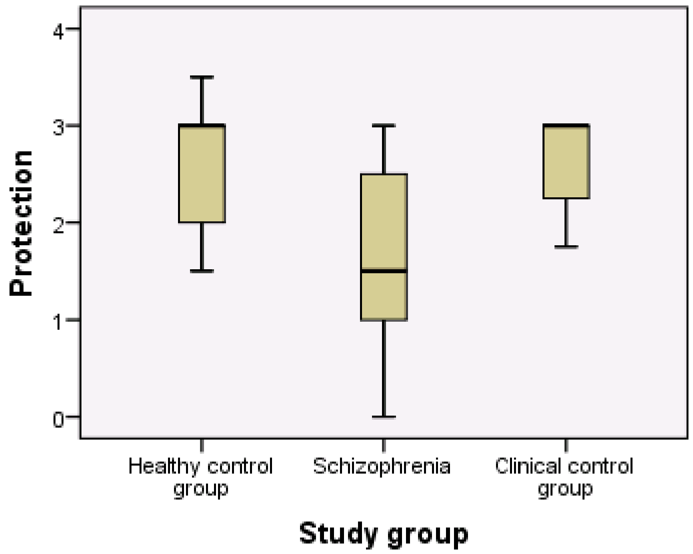
18h. INCAS Emotion Regulation scores across study groups.

Appendix 18

Graphical Presentation of Mean INCAS Scores across Study Groups



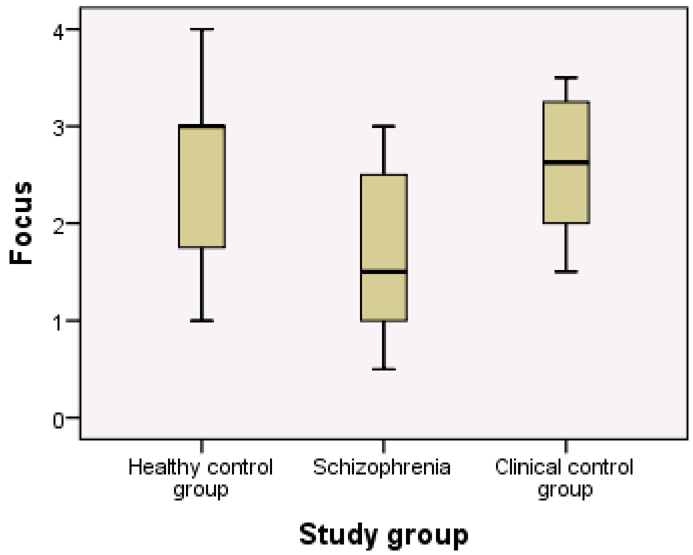
18i. INCAS Mindedness scores across study groups.



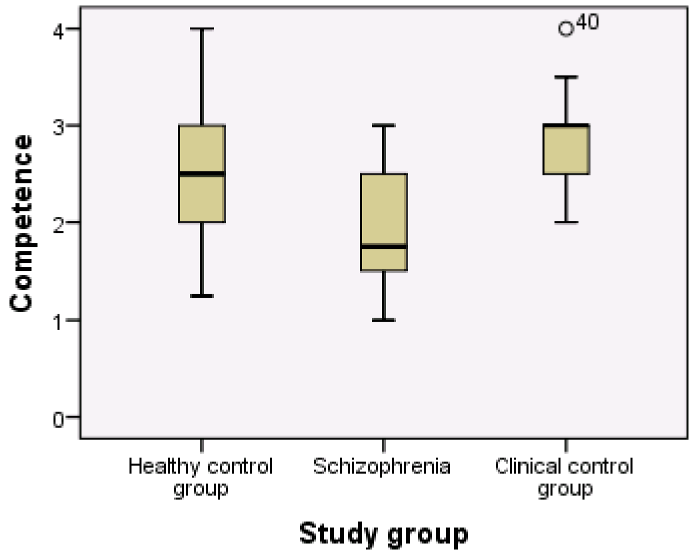
18j. INCAS Protection scores across study groups.

Appendix 18

Graphical Presentation of Mean INCAS Scores across Study Groups



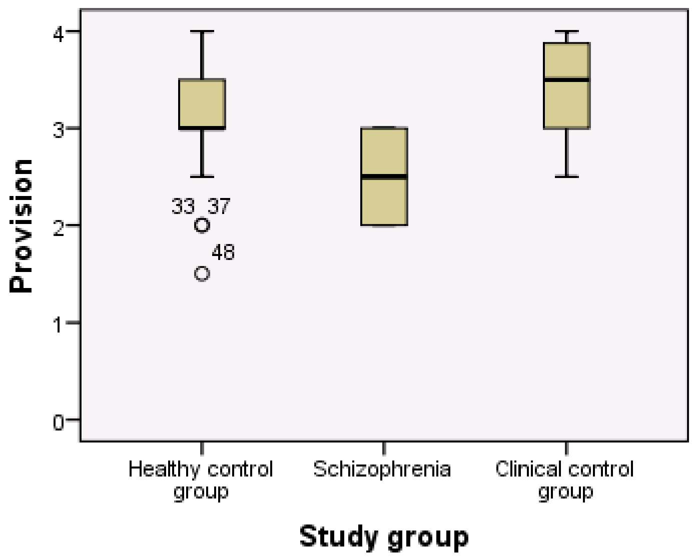
18k. INCAS Focus scores across study groups.



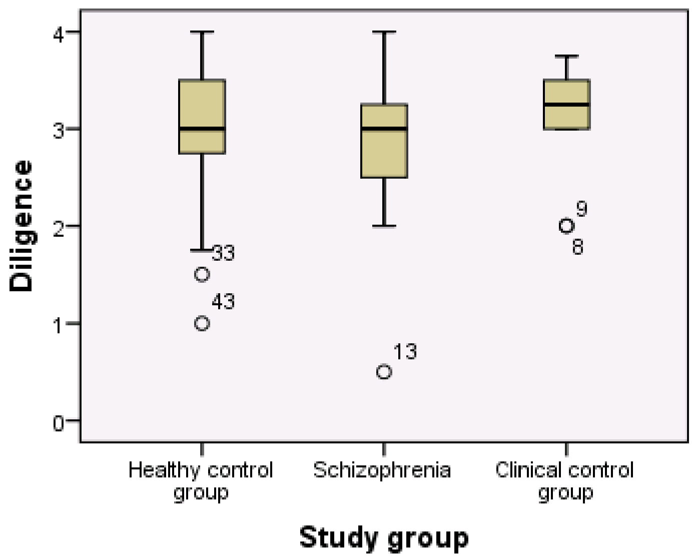
18l. INCAS Competence scores across study groups.

Appendix 18

Graphical Presentation of Mean INCAS Scores across Study Groups



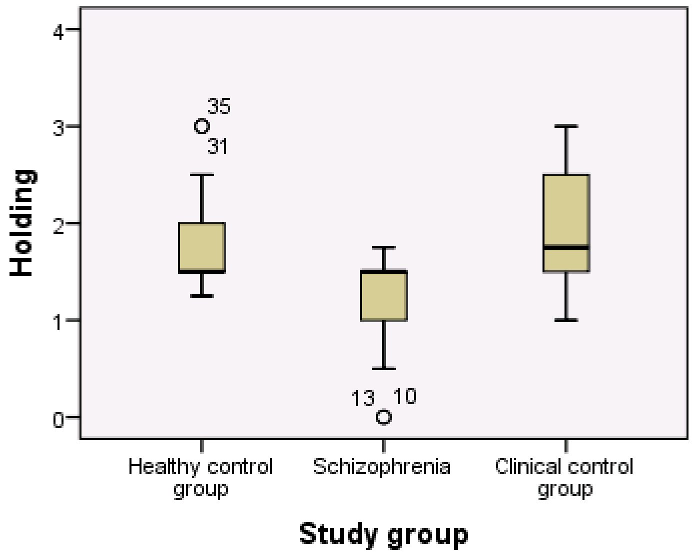
18m. INCAS Provision scores across study groups.



18n. INCAS Diligence scores across study groups.

Appendix 18

Graphical Presentation of Mean INCAS Scores across Study Groups



18o. INCAS Holding scores across study groups.

Appendix 19

Data relating to the NCAST

i. NCAST Feeding Scores across Study Groups

NCAST subscale scores μ(s.d.)	Schizophrenia (n=5)		Clinical Control (n=10)		Healthy Control (n=21)		Sig. (p)
Caregiver							
Sensitivity to cues	12.2	(2.3)	11.2	(3.1)	14.4	(1.4)	.001
Contingency score	3.4	(1. 7)	2.9	(1.5)	4.6	(1.4)	ns
Response to distress	9.2	(2.4)	8.7	(2.1)	10.4	(1.5)	ns
Contingency score	4.2	(2.4)	3.8	(2.0)	5.4	(1.5)	ns
Social-emotional growth fostering	10.0	(2.1)	10.2	(1.3)	11.7	(1.6)	.023
Contingency score	0.4	(0.6)	0.7	(0.5)	0.8	(0.4)	ns
Cognitive growth fostering	5.8	(1.3)	6.4	(1.7)	7.2	(1.4)	ns
Contingency score	1.2	(.84)	1.3	(0.8)	1.7	(0.7)	ns
Caregiver total	37.2	(5.8)	36.5	(6.3)	43.7	(4. 5)	.002
Contingency score	9.2	(4.4)	8.7	(3.8)	12.5	(3.2)	ns
Infant							
Clarity of cues	10.8	(1.1)	11.3	(3.1)	12.1	(1.7)	ns
Responsivity to caregiver	4.8	(0.5)	7.0	(1. 7)	8.1	(1.4)	<.001
Contingency score	1	(0.0)	1.9	(0.7)	1.5	(.5)	ns
NCAST Infant Total	15.6	(1.1)	18.3	(4. 5)	20.1	(2.8)	.022
Contingency score	1	(0.0)	1.9	(0.7)	1.5	(0.5)	ns
Total							
NCAST Caregiver/Infant	52.8	(5.8)	54.8	(8.3)	63.8	(6.6)	.001
Contingency score	10.2	(4.4)	10.6	(3.8)	14.0	(3.3)	ns

ii. Correlation (r) between INCAS and NCAST Scores

	INCAS Scores (n =36)		
NCAST subscale scores	Emotional	Instrumental	Total
Caregiver			
Sensitivity to cues	.36*	.17	.31
Contingency score	.29	.24	.30
Response to distress	.29	.30	.32
Contingency score	.29	.30	.32
Social-emotional growth fostering	.55**	.32	.50**
Contingency score	.48*	.47**	.53**
Cognitive growth fostering	.54**	.40*	.53**
Contingency score	.48**	.46**	.52**
Caregiver total	.53**	.35*	.50**
Contingency score	.41*	.39*	.44**
Infant			
Clarity of cues	.06	.15	.12
Responsivity to caregiver	.63**	.48**	.63**
Contingency score	.27	.27	.30
NCAST Infant Total	.36*	.33*	.38*
Contingency score	.27	.27	.30
Total			
NCAST Caregiver/Infant	.54**	.40*	.53**
Contingency score	.45**	.44**	.49**

**$p < .01$; *$p < .05$ (2-tailed)

Appendix 20

BSID data

i. Between-groups Comparison of Bayley Scales of Infant Development

A three-way between-subjects ANOVA showed a significant between-subjects effect of study group upon the Receptive Communication scores of infants at one year of age ($F(2, 14) = 5.20$, p =.014, partial n²=.458). A post-hoc analysis showed significant differences between infants of Healthy Control and Schizophrenia group mothers (p =.030) and between the infants of Schizophrenia and Clinical Control group mothers (p =.022). The difference between the Receptive Communication scores of the infants of Healthy and Clinical Control group mothers was not significant. There were no other significant between-group differences regarding BSID-III scores.

Infant Developmental Milestones across Study Groups at 12 Month Follow-up

Twelve BSID-III domain score μ(s.d.)	Schizophrenia (n=4)	Clinical Control (n=4)	Healthy Control (n=8)	Sig. (p)
Cognition	13.5 (1.29)	15.25 (0.5)	15.5 (1.69)	ns
Communication				
Receptive	9.25 (0.5)	12.25 (2.06)	11.88 (1.13)	.014
Expressive	13.5 (0.58)	14.25 (0.5)	13.5 (1.07)	ns
Motor				
Fine	12.75 (3.10)	16.25 (1.26)	15.75 (2.12)	ns
Gross	15.75 (1.5)	16.25 (1.5)	14.75 (1.75)	ns

ii. Dimension-level Regressions: INCAS and BSID-III

At the INCAS Dimension score level, significant models were found for both the Cognition and Receptive Communication domains of infant development.

Where BSID-III Cognition was entered as the criterion variable, INCAS Holding was found to be significant. Using the stepwise method, a significant model emerged: $F(1, 10) = 7.33$, $p=.022$. The model explains 36.5% of the variance (adjusted $R^2=.37$). Table 54 gives information for INCAS Holding, which was the predictor variable retained in the model. All other variables were non-significant and therefore excluded.

Regression Coefficients for INCAS Holding

INCAS Dimension	**B**	**SE B**	β
Holding	1.81	.67	0.65

Where BSID-III Receptive Communication was entered as the criterion variable, INCAS Provision, INCAS Mindedness, infant age, and SES were found to be significant predictors. Using the stepwise method, a significant model emerged: $F(1, 10) = 13.87$, $p=.004$. The model explains 92.6% of the variance (adjusted $R^2=.93$). Table 55 gives information for INCAS Provision and Mindedness, together with age of the infant at BSID testing and SES. These were the predictor variables that were found to be significant and thus retained within the model. All other variables were excluded as they were found to be insignificant.

Regression Coefficients for INCAS Provision, INCAS Mindedness, Infant Age, and SES

Variable	**B**	**SE B**	β
INCAS			
Provision	1.13	.21	.53
Mindedness	1.14	.20	.56
Infant age	-.33	.07	-.43
SES	.96	.39	.27

At the INCAS Dimension level, models containing other BSID-III developmental domains as the criterion variable were found to be non-significant.

Taken together, the results suggest that, on the INCAS Dimension score level, the quality of postpartum handling of the infant (as indexed by INCAS Holding) relates to the infant’s emerging cognitive development (as measured at one year using the BSID-III Cognition scale). It also appears that where infant age and socioeconomic status are held constant, the ability of the mother to materially provide for and verbally mentalise for her infant during the postpartum period can enhance the infant’s developing receptive communication, as measured at one year of age with the BSID-III.

Appendix 21

The Interpersonal Reactivity Index (IRI) (Davis, 1983)

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate letter on the scale at the top of the page: A, B, C, D, or E. When you have decided on your answer, fill in the letter on the answer sheet next to the item number. READ EACH ITEM CAREFULLY BEFORE RESPONDING. Answer as honestly as you can. Thank you.

The rating scale is as follows:

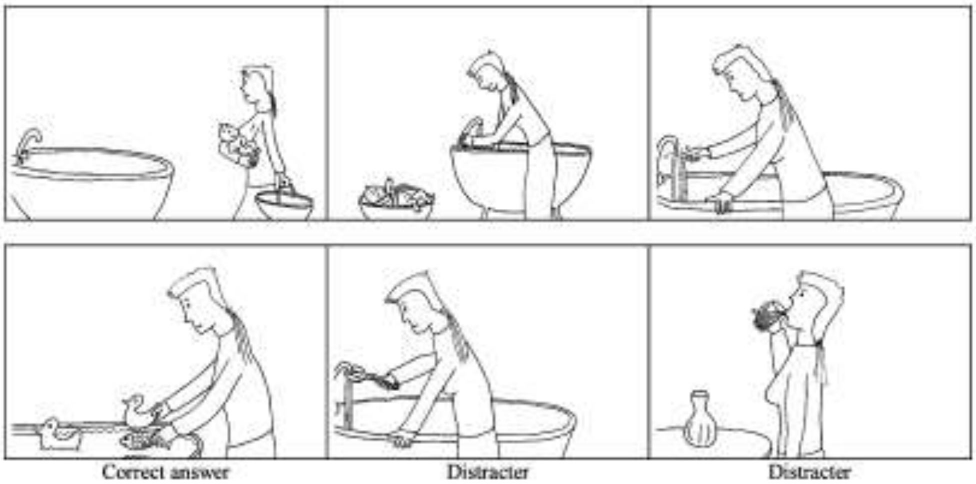
A	***B***	***C***	***D***	***E***
Does not describe me well				*Describes me very well*

1.	I daydream and fantasize, with some regularity, about things that might happen to me	**A**	**B**	**C**	**D**	**E**
2.	I often have tender, concerned feelings for people less fortunate than me	**A**	**B**	**C**	**D**	**E**
3.	I sometimes find it difficult to see things from the "other guy's" point of view	**A**	**B**	**C**	**D**	**E**
4.	Sometimes I don't feel very sorry for other people when they are having problems	**A**	**B**	**C**	**D**	**E**
5.	I really get involved with the feelings of the characters in a novel	**A**	**B**	**C**	**D**	**E**
6.	In emergency situations, I feel apprehensive and ill-at-ease	**A**	**B**	**C**	**D**	**E**
7.	I am usually objective when I watch a movie or play, and I don't often get completely caught up in it.	**A**	**B**	**C**	**D**	**E**
8.	I try to look at everybody's side of a disagreement before I make a decision	**A**	**B**	**C**	**D**	**E**
9.	When I see someone being taken advantage of, I feel kind of protective towards them	**A**	**B**	**C**	**D**	**E**
10.	I sometimes feel helpless when I am in the middle of a very emotional situation	**A**	**B**	**C**	**D**	**E**
11.	I sometimes try to understand my friends better by imagining how things look from their perspective	**A**	**B**	**C**	**D**	**E**
12.	Becoming extremely involved in a good book or movie is somewhat rare for me.	**A**	**B**	**C**	**D**	**E**
13.	When I see someone get hurt, I tend to remain calm	**A**	**B**	**C**	**D**	**E**
14.	Other people's misfortunes do not usually disturb me a great deal	**A**	**B**	**C**	**D**	**E**
15.	If I'm sure I'm right about something, I don't waste much time listening to other people's arguments	**A**	**B**	**C**	**D**	**E**

16.	After seeing a play or movie, I have felt as though I were one of the characters	**A**	**B**	**C**	**D**	**E**
17.	Being in a tense emotional situation scares me	**A**	**B**	**C**	**D**	**E**
18.	When I see someone being treated unfairly, I sometimes don't feel very much pity for them	**A**	**B**	**C**	**D**	**E**
19.	I am usually pretty effective in dealing with emergencies	**A**	**B**	**C**	**D**	**E**
20.	I am often quite touched by things that I see happen	**A**	**B**	**C**	**D**	**E**
21.	I believe that there are two sides to every question and try to look at them both	**A**	**B**	**C**	**D**	**E**
22.	I would describe myself as a pretty soft-hearted person	**A**	**B**	**C**	**D**	**E**
23.	When I watch a good movie, I can very easily put myself in the place of a leading character	**A**	**B**	**C**	**D**	**E**
24.	I tend to lose control during emergencies	**A**	**B**	**C**	**D**	**E**
25.	When I'm upset at someone, I usually try to "put myself in his shoes" for a while	**A**	**B**	**C**	**D**	**E**
26.	When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me	**A**	**B**	**C**	**D**	**E**
27.	When I see someone who badly needs help in an emergency, I go to pieces	**A**	**B**	**C**	**D**	**E**
28.	Before criticizing somebody, I try to imagine how I would feel if I were in their place	**A**	**B**	**C**	**D**	**E**

Appendix 22

Attribution of Intention to Others (AIO) (Sarfati et al., 2003), Example Item



Appendix 23

Hinting Task (Corcoran et al., 1995), Example Items

1. Lucy is broke but she wants to go out in the evening. She knows that David has just been paid. She says to him:

"I'm flat broke! Things are so expensive these days."

QUESTION: What does Lucy really mean when she says this?

ADD: Lucy goes on to say:

"Oh well, I suppose I'll have to miss my night out."

QUESTION: What does Lucy want David to do?

2. Jessica and Max are playing with a train set. Jessica has the blue train and Max has the red one. Jessica says to Max:

"I don't like this train."

QUESTION: What does Jessica really mean when she says this?

ADD: Jessica goes on to say:

"Red is my favourite colour."

QUESTION: What does Jessica want Max to do?

Appendix 24

Internal, Personal and Situational Attributions Questionnaire (IPSAQ) (Kinderman et al., 1996), Example Items

E.g. 1: A friend gave you a lift home.

What caused your friend to give you a lift home?
(Please write down the one major cause)

Is this:

a. Something about you?
b. Something about the other person or other people?
c. Something about the situation (circumstances or chance)?

E.g. 2: A friend talked about you behind your back.

What caused your friend to talk about you behind your back?
(Please write down the one major cause)

Is this:

a. Something about you?
b. Something about the other person or other people?
c. Something about the situation (circumstances or chance)?

Appendix 25

Correlations between INCAS Dimensions and Clinical Variables

Correlation (r) between INCAS Emotional Dimensions and the DASS

	Affection (n=49)	Interaction (n=49)	Empathy (n=49)	Adaptability (n=49)	Emotion Regulation (n=49)	Mindedness (n =48)
Depression	-.34*	-.41**	-.36*	-.22	-.25	-.21
Anxiety	-.47**	-.53**	-.45**	-.31*	-.35*	-.37*
Stress	-.27	-.42	-.37*	-.08	-.18	-.35*

**p< .01; *p< .05 (2-tailed)

Correlation (r) between INCAS Instrumental Dimensions and the DASS

	Protection (n=49)	Focus (n=49)	Competence (n=49)	Provision (n=49)	Diligence (n=49)	Holding (n=49)
Depression	-.06	.02	-.06	-.13	-.15	.02
Anxiety	-.19	-.03	-.23	-.21	-.16	-.07
Stress	-.13	.02	-.14	-.13	-.16	-.05

**p< .01; *p< .05 (2-tailed)

Correlation (r) between INCAS Emotional Dimensions and the MRS in the Clinical Control Group

	Affection (n=12)	Interaction (n=12)	Empathy (n=12)	Adaptability (n=12)	Affection (n=13)	Interaction (n=13)
Elevated mood	-	-	-	-	-	-
Increased motor activity/energy	.13	-.15	-.33	.02	.12	-.17
Sexual interest	-	-	-	-	-	-
Sleep	.13	-.15	-.33	.02	.12	-.17
Irritability	.07	-.13	-.17	.21	.07	-.06
Speech (rate/amount)	.13	-.15	-.33	.02	.12	-.17
Language/thought disorder	.13	-.15	-.33	.02	.12	-.17
Content	-	-	-	-	-	-
Disruptive/aggressive behaviour	-	-	-	-	-	-
Appearance	-	-	-	-	-	-
Insight	-	-	-	-	-	-
MRS Total Score	.12	-.16	-.31	.06	.11	-.16

(-) indicates all participants scored 0. ** $p< .01$; * $p< .05$ (2-tailed)

Correlation (r) between INCAS Instrumental Dimensions and the MRS in the Clinical Control Group

	Protection (n=13)	Focus (n=13)	Competence (n=13)	Provision (n=13)	Diligence (n=13)	Holding (n=13)
Elevated mood	-	-	-	-	-	-
Increased motor activity/energy	-.41	-.47	.12	.38	-.03	-.34
Sexual interest	-	-	-	-	-	-
Sleep	-.41	-.47	.12	.38	-.03	-.34
Irritability	-.60	-.53	.06	.14	-.40	-.26
Speech (rate/amount)	-.41	-.47	.12	.38	-.03	-.34
Language/ thought disorder	-.41	-.47	.12	.38	-.03	-.34
Content	-	-	-	-	-	-
Disruptive/aggressive behaviour	-	-	-	-	-	-
Appearance	-	-	-	-	-	-
Insight	-	-	-	-	-	-
MRS Total Score	-.47	-.50	.12	.35	-.11	-.34

(-) indicates all participants scored 0. ***p*< .01; **p*< .05 (2-tailed)

Correlations (r) between INCAS Emotional Dimensions and the PANSS in the Schizophrenia Group

	INCAS Emotional Dimensions					
	Affection (n=13)	Interaction (n=13)	Empathy (n=13)	Adaptability (n=13)	Affection (n=13)	Interaction (n=13)
Positive symptoms						
Delusions	-.27	-.05	-.20	.11	-.03	-.64*
Conceptual disorganisation	.25	.21	-.12	-.10	.05	-.43
Hallucinatory behaviour	-.13	-.03	-.20	.16	-.09	-.32
Excitement	.04	.21	.07	.13	.22	-.64*
Grandiosity	-.48	-.24	-.50	-.37	-.43	-.73**
Suspiciousness/Persecution	-.28	-.10	-.15	-.08	-.003	-.68*
Hostility	-.41	-.29	-.49	-.22	-.25	-.50
Positive Symptom Total	**-.21**	**-.04**	**-.26**	**-.03**	**-.07**	**-.69****
Negative symptoms						
Blunted Affect	-.08	-.29	-.14	-.40	-.44	.23
Emotional withdrawal	-.22	-.44	-.47	-.35	-.49	.26
Poor rapport	-.03	-.19	-.20	-.17	-.18	-.05
Passive/ apathetic/social withdrawal	.15	-.13	.23	.23	-.02	.43
Difficulty in abstract thinking	.05	-.07	-.20	-.31	-.20	-.46
Lack of spontaneity & conversational flow	-.38	-.51	-.38	-.59*	-.67*	.00
Stereotyped thinking	-.29	-.20	-.44	-.44	-.41	-.66*
Negative Symptom Total	**-.20**	**-.42**	**-.40**	**-.52**	**-.59***	**-.11**

**p< .01; *p< .05 (2-tailed)

Correlation (r) between INCAS Instrumental Dimensions and the PANSS in the Schizophrenia Group

	INCAS Instrumental Dimensions					
	Protection (n=13)	Focus (n=13)	Competence (n=13)	Provision (n=13)	Diligence (n=13)	Holding (n=13)
Positive symptoms						
Delusions	-.03	-.16	.12	-.49	-.40	-.41
Conceptual disorganisation	-.41	-.43	-.002	-.21	-.25	-.18
Hallucinatory behaviour	.03	-.11	.07	-.38	-.43	-.50
Excitement	.03	-.03	.32	-.21	-.11	-.16
Grandiosity	-.31	-.24	-.25	-.42	-.08	-.45
Suspiciousness/ persecution	.05	.03	.21	-.45	-.03	-.14
Hostility	-.27	-.43	-.11	-.47	-.53	-.65*
Positive Symptom Total	**-.13**	**-.23**	**.09**	**-.48**	**-.34**	**-.43**
Negative symptoms						
Blunted affect	-.13	.32	-.42	-.20	.30	-.13
Emotional withdrawal	-.34	-.25	-.33	-.34	-.24	-.36
Poor rapport	-.29	-.34	-.17	-.14	.00	.16
Passive/ apathetic/social withdrawal	.20	.42	.21	.00	.25	.17
Difficulty in abstract thinking	-.47	-.32	-.27	-.34	-.03	-.15
Lack of spontaneity & conversational flow	-.37	.04	-.56*	-.34	.43	.03
Stereotyped Thinking	-.42	-.20	-.37	-.47	-.18	-.58*
Negative Symptom Total	-.45	**-.07**	**-.49**	**-.45**	**.12**	**-.25**

**$p < .01$; *$p < .05$ (2-tailed)

Correlation (r) between INCAS Emotional Dimensions and the CDSS

	Affection (n=13)	Interaction (n=13)	Empathy (n=13)	Adaptability (n=13)	Emotion Regulation (n=13)	Mindedness (n=13)
Depression	-.24	-.34	-.10	.11	-.12	.24
Hopelessness	.42	.35	.59	.42	.37	.40
Self-depreciation	-.16	-.10	-.23	-.35	-.20	.11
Guilty ideas of reference	-.29	-.27	-.28	-.26	-.17	-.49
Pathological guilt	-.17	-.26	-.05	-.11	-.43	-.02
Morning depression	-.36	-.18	-.32	-.41	-.11	-.41
Early wakening	.13	.04	.22	.28	.06	.28
Suicide	-.43	-.25	-.49	-.40	-.50	-.54
Observed depression	-.03	-.08	.21	.27	.05	.24
CDSS Total	-.25	-.26	-.12	-.14	-.25	-.09

***p*< .01; **p*< .05 (2-tailed)

Correlation (r) between INCAS Instrumental Dimensions and the CDSS

	Protection (n=13)	Focus (n=13)	Competence (n=13)	Provision (n=13)	Diligence (n=13)	Holding (n=13)
Depression	.04	-.12	-.14	-.06	-.47	-.44
Hopelessness	.37	.36	.38	.35	.24	.18
Self-depreciation	-.19	-.14	-.24	-.07	-.29	-.51
Guilty ideas of reference	-.20	-.31	-.06	-.54	-.38	-.59
Pathological guilt	.01	.15	-.18	-.28	.36	.09
Morning depression	-.23	-.23	-.18	-.15	-.27	-.36
Early wakening	.22	.16	.07	.21	.05	.07
Suicide	-.48	-.38	-.45	-.36	-.23	-.63
Observed depression	.24	.20	.06	.26	.04	.02
CDSS Total	.05	-.09	-.15	-.23	-.21	-.48

***p*< .01; **p*< .05 (2-tailed)

Correlation (r) between INCAS Emotional Dimensions and Chlorpromazine Equivalence in the Schizophrenia Group

	Affection (n=13)	Interaction (n=13)	Empathy (n=13)	Adaptability (n=13)	Emotion Regulation (n=13)	Mindedness (n=13)
Cpz Eq.	-.05	-.09	1.9	.45	.18	.14

**p< .01; *p< .05 (2-tailed)

Correlation (r) between INCAS Instrumental Dimensions and Chlorpromazine Equivalence in the Schizophrenia Group

	Protection (n=13)	Focus (n=13)	Competence (n=13)	Provision (n=13)	Diligence (n=13)	Holding (n=13)
Cpz Eq.	.52	.45	.41	-.20	-.23	-.13

**p< .01; *p< .05 (2-tailed)

Appendix 26

Correlations (r) between INCAS Domain and Total Scores and the MRS

Side Effects:	INCAS Total (n=12)	Emotional Domain (n=12)	Instrumental Domain (n=12)
Elevated mood	-	-	-
Increased motor activity/energy	-.18	-.09	-.17
Sexual interest	-	-	-
Sleep	-.18	-.09	-.17
Irritability	-.23	-.01	-.35
Speech (rate/amount)	-.18	-.09	-.17
Language/ thought disorder	-.18	-.09	-.17
Content	-	-	-
Disruptive/aggressive behaviour	-	-	-
Appearance	-	-	-
Insight	-	-	-
MRS Total Score	-.20	-.08	-.22

**p< .01; *p< .05 (2-tailed). Dash (-) is where all participants scored 0.

Appendix 27
Correlations between INCAS Dimensions and Cognitive Variables

Correlations (r) between Emotional INCAS Dimensions and WebNeuro Composite Scores

WN Domain	Affection (n=49)	Interaction (n=49)	Empathy (n=49)	Adaptability (n=49)	Emotion Regulation (n=49)	Mindedness (n=48)
Response speed	.135	.214	.090	.311*	.211	.226
Impulsivity	.154	.096	.167	.248	.333*	.196
Attention	.150	.149	.215	.241	.347*	.212
Information processing	.076	.106	.120	.266	.282*	.227
Memory	.104	.079	.195	.207	.202	.196
Executive functioning	.110	.221	.087	.102	.272	.261
Emotion Reaction time	.014	.057	-.008	.011	-.033	.061
Emotion bias	-.148	-.051	-.071	-.105	-.168	-.056

**$p< .01$; *$p< .05$

Correlations (r) between Instrumental INCAS Dimensions and WebNeuro Composite Scores

WN Domain	Protection (n=49)	Focus (n=49)	Competence (n=49)	Provision (n=49)	Diligence (n=49)	Holding (n=49)
Response speed	.44**	.18	.44**	.31*	.09	.35*
Impulsivity	.27	.20	.23	.15	.20	.25
Attention	.13	-.00	-.12	-.07	-.16	-.09
Information processing	.34*	.20	.06	.13	-.01	.14
Memory	.35*	.29*	.13	.12	.06	.28
Executive functioning	.30*	.12	.16	.18	-.12	.11
Emotion reaction time	.24	.20	.30*	.20	.11	.28
Emotion bias	.01	.03	.16	.06	.14	.22

**$p< .01$; *$p< .05$ (2-tailed)

Correlations (r) between INCAS Emotional Dimensions and Wisconsin Card Sort Test Scores

WCST Domain	Affection (n=43)	Interaction (n=43)	Empathy (n=43)	Adaptability (n=43)	Emotion Regulation (n=43)	Mindedness (n=42)
Total errors	-.12	-.27	.09	.01	-.18	-.16
Perseverative responses	-.10	-.23	.17	.05	-.17	-.11
Perseverative errors	-.10	-.23	.18	.06	-.16	-.11
Nonperseverative errors	-.13	-.29	-.04	-.05	-.19	-.20
% conceptual lvl. responses	.06	.21	-.12	-.05	.14	.16

***p< .01; *p< .05 (2-tailed)

Correlations (r) between INCAS Instrumental Dimensions and Wisconsin Card Sort Test Scores

WCST Domain	Protection (n=43)	Focus (n=43)	Competence (n=43)	Provision (n=43)	Diligence (n=43)	Holding (n=43)
Total errors	-.05	-.17	-.04	-.18	.07	-.08
Perseverative responses	-.00	-.08	-.03	-.19	.10	.01
Perseverative errors	.01	-.09	-.02	-.18	.10	.01
Nonperseverative errors	-.13	-.26	-.06	-.17	.02	-.19
% conceptual lvl. responses	.04	.15	.01	.16	-.08	.09

**p< .01; *p< .05 (2-tailed)

Correlations (r) between INCAS Emotional Dimensions and WN Facial Affect Scores

WN Emotion Identification Item	Affection (n=44)	Interaction (n=44)	Empathy (n=44)	Adaptability (n=44)	Emotion Regulation (n=44)	Mindedness (n=43)
Emotion memory						
Fear %	-.16	-.13	-.22	-.04	-.20	.07
Fear RT	.19	.08	.05	-.01	.06	.05
Angry %	.23	.17	.13	.17	.20	.31
Angry RT	.29	.25	.21	.20	.18	.27
Disgust %	-.15	-.12	-.21	-.02	-.19	.09
Disgust RT	.28	.19	.12	.30	.31	.28
Sad %	-.22	-.18	-.22	-.12	-.20	.07
Sad reaction time	.31	.17	.17	.05	.17	.16
Happy %	-.15	-.12	-.21	-.03	-.19	.08
Happy RT	.34	.19	.14	.12	.23	.18
Neutral %	-.13	-.13	-.14	-.21	-.10	.02
Neutral RT	-.06	-.13	-.06	-.16	-.15	.03
Emotion Recognition						
Fear %	.12	.24	.22	.13	.24	.13
Fear RT	.07	.17	.10	.06	.14	.17
Angry %	-.08	-.03	.02	-.01	.01	.08
Angry RT	-.06	-.01	-.04	-.04	-.12	.06
Disgust %	.21	.26	.23	.12	.32	.34
Disgust RT	-.16	.01	-.16	-.16	-.13	.07
Sad %	.15	.11	.21	.07	.09	.24
Sad RT	-.03	-.07	-.07	.07	-.20	-.01
Happy %	-.19	-.09	.02	-.02	.08	-.04
Happy RT	.21	.18	.16	.24	.18	.15
Neutral %	-.05	-.09	.05	-.04	.14	.11
Neutral RT	-.04	.03	.10	.07	.05	.07

*$p < .01$ (2-tailed); RT= Reaction Time; % = percent accuracy.

Correlations (r) between INCAS Instrumental Dimensions and WN Facial Affect Scores

WN Emotion Identification Item	Protection (n=44)	Focus (n=44)	Competence (n=44)	Provision (n=44)	Diligence (n=44)	Holding (n=44)
Emotion memory						
Fear %	.01	.06	-.19	-.04	-.00	-.03
Fear RT	.37	.26	.16	.10	.01	.08
Angry %	.43*	.42*	.21	.32	.25	.20
Angry RT	.50*	.33	.41*	.35	.14	.21
Disgust %	.05	.10	-.15	-.02	.02	.00
Disgust RT	.54*	.36	.30	.28	.01	.21
Sad %	.10	.11	-.08	-.08	-.10	.02
Sad RT	.32	.31	.19	.18	.11	.05
Happy %	.05	.10	-.16	-.03	.01	.00
Happy RT	.39*	.27	.23	.29	.24	.19
Neutral %	.13	.03	.14	.18	.01	.01
Neutral RT	.31	.21	.08	.15	.07	.08
Emotion Recognition						
Fear %	.38	.39*	.36	.18	.16	.33
Fear RT	.32	.29	.28	.29	.18	.27
Angry %	.14	-.03	.34	.19	-.07	.14
Angry RT	.23	.20	.27	.18	.06	.22
Disgust %	.32	.23	.22	.19	.10	.20
Disgust RT	.14	.14	.07	.13	-.04	-.13
Sad %	.30	.35	.13	.12	.07	.24
Sad RT	.18	.18	.23	.05	.10	.23
Happy %	.03	.02	-.18	-.06	-.12	-.05
Happy RT	.32	.19	.15	.23	.03	.22
Neutral %	.28	.29	.03	.08	.16	.29
Neutral RT	.33	.33	.19	.03	-.01	.14

*$p < .01$ (2-tailed); RT= Reaction Time; % = percent accuracy.

Correlations (r) between INCAS Emotional Dimensions and IRI Scores

	Affection (n=48)	Interaction (n=48)	Empathy (n=48)	Adaptability (n=48)	Emotion Regulation (n=48)	Mindedness (n=47)
IRI Domain						
Empathic concern	.14	.23	.01	.19	.10	.26
Perspective taking	.18	.28	.18	.17	.10	.29*
Personal distress	.05	-.16	-.07	-.06	.04	-.24
Fantasy Scale	.07	.09	-.07	-.03	.08	.16

$^{**}p < .01$; $^{*}p < .05$ (2-tailed)

Correlations (r) between INCAS Instrumental Dimensions and IRI Scores

	Protection (n=48)	Focus (n=48)	Competence (n=48)	Provision (n=48)	Diligence (n=48)	Holding (n=48)
IRI Domain						
Empathic concern	.26	.19	.17	.36*	.10	.13
Perspective taking	.27	.26	.15	.16	.20	.07
Personal distress	-.12	-.08	-.17	-.19	-.03	.01
Fantasy Scale	.12	.03	.04	.13	.05	.11

$^{**}p < .01$; $^{*}p < .05$ (2-tailed)

Correlations (r) between INCAS Emotional Dimensions and AIO Scores

	Affection (n=48)	Interaction (n=48)	Empathy (n=48)	Adaptability (n=48)	Emotion Regulation (n=48)	Mindedness (n=47)
AIO score	.32*	.47**	.17	.36*	.40**	.30*

***p*< .01; **p*< .05 (2-tailed)

Correlations (r) between INCAS Instrumental Dimensions and AIO Scores

	Protection (n=48)	Focus (n=48)	Competence (n=48)	Provision (n=48)	Diligence (n=48)	Holding (n=48)
AIO score	.15	.20	.21	.24	-.06	.12

***p*< .01; **p*< .05 (2-tailed)

Correlations (r) between INCAS Emotional Dimensions and Hinting Task Scores

	Affection (n=47)	Interaction (n=47)	Empathy (n=47)	Adaptability (n=47)	Emotion Regulation (n=47)	Mindedness (n=46)
HT Score	.38**	.36*	.18	.46**	.40**	.34*

***p*< .01; **p*< .05 (2-tailed)

Correlations (r) between INCAS Instrumental Dimensions and Hinting Task Scores

	Protection (n=47)	Focus (n=47)	Competence (n=47)	Provision (n=47)	Diligence (n=47)	Holding (n=47)
HT Score	.31*	.16	.26	.28	-.19	.16

***p*< .01; **p*< .05 (2-tailed)

Correlations (r) between INCAS Emotional Dimensions and IPSAQ Scores Scores

	Affection (n=45)	Interaction (n=45)	Empathy (n=45)	Adaptability (n=45)	Emotion Regulation (n=45)	Mindedness (n=44)
Positive events						
Internal	.09	.00	-.01	.21	.04	.09
External, Personal	-.04	.02	-.05	.07	.13	-.05
External, Situational	-.06	-.01	.01	-.20	-.25	-.11
Negative events						
Internal	-.18	-.18	-.23	.08	-.17	-.13
External, Personal	.05	.18	.09	.22	.25	.15
External, Situational	.12	.02	.13	-.23	-.20	-.04
Attributional bias						
Externalising bias	.29	.21	.26	.10	.24	.22
Personalising bias	-.08	.04	-.02	.29	.29	.12

$^{**}p < .01$; $^{*}p < .05$ (2-tailed)

Correlations (r) between INCAS Instrumental Dimensions and IPSAQ Scores

	Protection (n=45)	Focus (n=45)	Competence (n=45)	Provision (n=45)	Diligence (n=45)	Holding (n=45)
Positive events						
Internal	.08	.04	.16	.12	-.14	.26
External, Personal	.15	.06	.05	-.07	.03	.00
External, Situational	-.13	-.03	-.11	-.03	.17	-.18
Negative events						
Internal	-.32*	-.28	.08	-.13	-.23	.07
External, Personal	.23	.17	.25	.17	.06	.06
External, Situational	.00	.08	-.09	.01	.24	-.02
Attributional bias						
Externalising bias	.30*	.30*	.24	.27	.14	.16
Personalising bias	.19	.11	.18	.07	-.16	.08

***p*< .01; **p*< .05 (2-tailed)

Appendix 28

Factorability and Sampling Adequacy as Measured by KMO and Bartlett's Tests

Kaiser-Meyer-Olkin measure of sampling adequacy		.826
Bartlett's test of sphericity		
	Approx. Chi-square	73.57
	df	10
	Sig.	<.001

Appendix 29

Factorability and Sampling Adequacy as Measured by KMO and Bartlett's Tests

Kaiser-Meyer-Olkin measure of sampling adequacy		.596
Bartlett's test of sphericity		
	Approx. Chi-square	24.39
	df	3
	Sig.	<.001