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Maternal Age, Psychological Maturity, Parenting Cognitions, and Mother-Infant Interaction

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Abstract

In the context of the trend toward delayed childbearing, the aim of the present study was to examine relations among maternal age and the quality of maternal interactive behavior at 7-months assessed using sensitivity and mind-mindedness, while also considering whether age effects were attributable to psychological maturity and parenting cognitions. Participants were 150 Australian mothers (mean age 33-years) and their first-born infants who were participating in a prospective study of parenthood. Path analysis showed maternal age had both direct and indirect associations with maternal interactive behavior. Older mothers made more mind-related comments to their infants. They were also more sensitive however this effect was indirect and explained by greater psychological maturity (hardiness) and a more internal locus of control with regards to parenting. Results suggest that older maternal age may confer some benefits in terms of responsive parenting in infancy.

Key words: maternal age, hardiness, parental locus of control, sensitivity, mind-mindedness

Maternal Age, Psychological Maturity, Parenting Cognitions, and Mother-Infant Interaction

Increasing numbers of women in developed countries are having first births after the age of 35 (Li, Zeki, Hilder, & Sullivan, 2013; Office of National Statistics, 2012; U.S. Census Bureau, 2012). Although the biological and medical risks of childbearing for 'older' women, usually defined as age 35 and above, are well recognised (Carolan & Frankowska, 2011; Schmidt, Sobotka, Bentzen, & Nyboe Andersen, 2012), largely unsubstantiated negative views regarding the parenting capacity of older mothers are also common (Shaw & Giles, 2009). Empirical findings suggest that older motherhood may confer some benefits in terms of less mother-child conflict in the preschool years (Barnes, Gardiner, Sutcliffe, & Melhuish, 2013), improved child health and development up to the age of five (Sutcliffe, Barnes, Belsky, Gardiner, & Melhuish, 2012) and children's cognitive and educational achievement at age 18 (Fergusson & Woodward, 1999). There is limited empirical evidence, however, about parenting quality related to older maternal age and the psychological correlates linking age and outcomes (Fergusson & Woodward, 1999; Ragozin, Basham, Crnic, Greenberg, & Robinson, 1982).

Age and Parenting

An association between maternal age and parenting practices is well established in studies that compare teenage mothers with 'adult' mothers (McFadden & Tamis-Lemonda, 2013). In general, findings indicate that parenthood at young ages is associated with less optimal parenting. Studies report, for example, that teenage mothers show fewer positive (less responsive, supportive, sensitive, and verbal) and more negative (detached, intrusive) interactive behaviors than their adult counterparts (Berlin, Brady-Smith, & Brooks-Gunn, 2002; McFadden & Tamis-Lemonda, 2013). Much less is known about the quality of parenting in older mothers, however a small number of studies to date suggest they may be more responsive and sensitive (Broom, 1994; Ragozin et al., 1982; Schlomer & Belsky,

2012). Bornstein and colleagues (Bornstein & Putnick, 2007; Bornstein, Putnick, Suwalsky, & Gini, 2006) have demonstrated that relations between maternal age at first birth and parenting practices vary across the spectrum of maternal age. A non-linear age effect was observed in regards to maternal sensitivity and structuring during interactions between first-time mothers and their 5-month old infants, with maternal age conferring a direct benefit in terms of parenting up to the age of 30 but not beyond this age (Bornstein et al., 2006). The researchers invoked the ‘maternal maturity hypothesis’ to suggest that older mothers are likely to benefit from greater psychological preparedness, life experience and resources. However, personality traits, sense of identity and cognitive functions mature at around age 30, perhaps explaining the attenuation in any age-related parenting benefits thereafter.

The proposed benefits of psychological maturity for parenting are consistent with the parenting models of Belsky (1984) and Heinicke (1984) who suggest that while parenting is multiply determined, parental attributes or psychological resources are particularly important. Psychological maturity is believed to confer a capacity for care that is supportive, sensitive, responsive, and stimulating. Age is often conflated with maturity due to beliefs that maturity increases with age (Belsky, 1984; Bornstein & Putnick, 2007). In qualitative studies mothers aged over 35 have reported a psychological readiness for motherhood related to personal growth, emotional stability and maturity (Carolan, 2005; Mac Dougall, Beyene, & Nachtigall, 2012). Few studies, however, explicitly examine whether a parent’s age may be related to psychological maturity when evaluating the effect of either age or parental attributes on parenting (Belsky & Barends, 2002), and this is one objective of the current study.

Psychological Maturity

One contributing factor to the dearth of empirical research may be the challenge of operationalizing the construct of psychological maturity. Previous approaches have included measures of ego development, ego resiliency, clinical interviews tapping multiple facets of

psychological makeup such as ego strength, life adaptation, or psychological integration, and composites of multiple measures (Belsky & Barends, 2002). These constructs have been found, in the main, to predict quality of parental interactive behavior in infancy and early childhood.

A previous report (reference removed for blind review, 2014) with a larger sample from which participants in the present study were drawn, showed that older maternal age was associated with a latent construct of psychological maturity and that psychological maturity contributed to reports of more optimal adjustment in pregnancy and the early months of motherhood. [Maturity was conceptualised as a two-dimensional construct encompassing indices of adaptive self-regulation, represented by hardiness \(Kobasa, Maddi, & Kahn, 1982\) and ego resiliency \(Block & Block, 1980\), and social-cognitive maturity characterized by ego development \(Loevinger, 1976\).](#) Results suggested that the self-regulatory dimension accounted for the effects of maturity on adjustment; ego development was not associated with any adjustment outcomes, ego resiliency was related to most, hardiness, however was related to all measures of adjustment in pregnancy and the early postnatal months with the largest effect sizes.

Hardiness is characterized as a personality construct, with three interrelated components of commitment, control and challenge, and is believed to promote self-regulation in potentially stressful situations (Gramzow, Sedikides, Panter, & Insko, 2000; Maddi, Khoshaba, Harvey, Fazel, & Resurreccion, 2011). Hardiness involves flexibility, adaptation, and a sense of internal control in the face of changing environments (Kobasa et al., 1982), which is conceptually similar to some parental attributes identified as important determinants of parenting in earlier research, namely the ability to efficiently, calmly, and flexibly approach problem solving (Heinicke, 1984) and the capacity to regulate emotions and take the perspective of others (Belsky, 1984). While hardiness is viewed as a relatively stable

personality characteristic resulting from early familial experience, a capacity for change is acknowledged in response to repeated experiences of turning adversity into opportunity as part of ongoing development (Maddi et al., 2011).

There is some evidence that older mothers may be more hardy (reference removed for blind review, 2014; McMahon, Gibson, Allen, & Saunders, 2007) and that hardiness may be associated with more adaptive parenting cognitions and bedtime interactions, contributing to fewer toddler sleep problems (Johnson & McMahon, 2008). The current study seeks to extend previous research by examining relations among maternal age, hardiness and parenting using observational rather than self-report measures to assess parenting quality in infancy.

Parenting Cognitions

Hardiness is thought to enable adaptation to changing environments primarily through cognitive appraisals (Gramzow et al., 2000; Maddi, 2002). As cognitions and beliefs about parenting are important determinants of parenting behavior (Bornstein & Putnick, 2007; Sameroff & Feil, 1985; Teti, O'Connell, & Reiner, 1996) parenting cognitions may be one pathway through which hardiness may influence parenting quality. Hardiness involves the belief that one has a definite influence (Maddi, 2002), similar to concepts of self-efficacy and internal locus of control that have been associated with sensitive, responsive, and less authoritarian parenting (Bornstein, Hendricks, Haynes, & Painter, 2007; Bugental & Johnston, 2000; Donovan, Taylor, & Leavitt, 2007). Parents with a more external locus of control have low parental self-efficacy, a sense they are dominated by child demands, and believe they have little impact on the parent-child relationship and child development and behavior (Campis, Lyman, & Prentice-Dunn, 1986).

Researchers have suggested that perception of control with respect to parenting could stem from parental personality (Hagekull, Bohlin, & Hammarberg, 2001), but this has not

been empirically confirmed to our knowledge. However, previous studies have reported associations between parental personality and parental self-efficacy (Bornstein, Hahn, & Haynes, 2011), and parental efficacy was found to mediate the relationship between parental personality traits and parenting behaviors (de Haan, Prinzie, & Dekovic, 2009). Freed and Tompson (2011) examined correlates of parental locus of control in mothers aged 29 to 55 years with children aged 8 to 14 years and found older maternal age was associated with lower feelings of parenting control, while education contributed to greater parenting efficacy. These findings contradict the generally held view that older mothers are likely to be better educated and possess greater maturity, which may engender beliefs of having greater influence with respect to parenting (Bornstein & Putnick, 2007; Freed & Tompson, 2011). Whether older mothers are more psychologically mature (hardy), and whether hardiness influences cognitions regarding parental locus of control and the quality of interactions between mothers and their infants is the focus of the current study.

Mother-Infant Interaction

Sensitive parenting is believed to be important for the development of a secure attachment relationship and influences many aspects of socio-emotional and cognitive development during infancy and childhood (Bernier, Jarry-Boileau, Tarabulsky, & Miljkovitch, 2010; Bornstein, Hahn, Suwalsky, & Haynes, 2011). A sensitive caregiver is able to see the infant's point of view, perceive and accurately interpret their signals, and respond appropriately and promptly (Ainsworth, Blehar, Waters, & Wall, 1978). Sensitivity is considered an affective and behavioral quality of the dyadic interaction between mother and infant, rather than solely a stable maternal characteristic (Nicholls & Kirkland, 1996). Individual differences are influenced by a host of parental variables including personal attachment history, belief systems, culture, and ecological considerations such as marital relationship, work environment, and social support, as well as socio-demographic factors

such as education, and child characteristics (Bornstein et al., 2007). Research that compares adolescent with adult mothers has typically found that maternal age is related to sensitivity, although some studies have not found this association (Bernier et al., 2010).

Related to, but distinct from sensitivity, mind-mindedness is defined as a mother's proclivity to treat her child as an individual with a mind and to view her infant's behavior as meaningful (for a review see Meins, 2013). Meins and colleagues (Meins et al., 2012) suggest it is necessary to consider mind-related language, ascribing thoughts, feelings, ideas, and intentions to infants, in addition to caregiver behavior to fully capture the richness of a caregiver's responding. Mind-mindedness, assessed in infancy, has been shown in some studies to predict attachment security, over and above any contribution of maternal sensitivity (Meins, 2013; Meins et al., 2012).

Although a number of previous studies have found an association between mind-mindedness and maternal sensitivity (Demers, Bernier, Tarabulsky, & Provost, 2010b; Laranjo, Bernier, & Meins, 2008; Meins, Fernyhough, Arnott, Turner, & Leekam, 2011; Rosenblum, McDonough, Sameroff, & Muzik, 2008), some have not (Demers, Bernier, Tarabulsky, & Provost, 2010a; McMahon & Meins, 2012) and different approaches to the measurement of both constructs have confounded study comparisons. In contrast to sensitivity, mind-mindedness is believed to be a relatively stable way of thinking about specific close relationships that is not influenced by socio-economic factors, maternal psychological well-being, or infant characteristics (Meins et al., 2011; Meins, Fernyhough, & Harris-Waller, 2014), although it may be related to maternal age. Demers et al. (2010b), found that adult mothers (aged > 20, mean age 28.7 years) made significantly more positive mind-related comments than adolescent mothers when interacting with their 18-month old children, and a significant positive association was also reported between maternal age (range 16-41 years) and mothers' mind-mindedness with younger infants aged eight months (Meins,

Centifanti, Fernyhough, & Fishburn, 2013). In the current study we propose to examine relations among maternal age, hardiness, parental locus of control, and both mind-mindedness and maternal sensitivity as indicators of parenting quality.

Study findings are mixed regarding the impact of education on maternal sensitivity (Bernier et al., 2010; Bornstein et al., 2007; Schlomer & Belsky, 2012) and mind-mindedness (McMahon & Meins, 2012; Meins et al., 2011; Rosenblum et al., 2008), however controlling for the possible confounding effect of maternal education on parenting may be particularly important when attempting to isolate the effects of maternal age given that women who delay parenthood are generally better educated (Bornstein & Putnick, 2007).

Parenting practices may also be influenced by parental psychological wellbeing and child characteristics, such as infant temperament, but associations between these variables and sensitivity and mind-mindedness are inconsistent (Bates, Schermerhorn, & Petersen, 2012; Belsky & Jaffee, 2006; Broom, 1994; Demers et al., 2010a; McMahon & Meins, 2012; Meins et al., 2011; Rosenblum et al., 2008). Maternal psychological distress and infant temperament will be considered as possible covariates together with maternal education.

Older maternal age is associated with an increased likelihood of medically assisted conception due to age-related fertility decline (Schmidt et al., 2012), but few studies consider the impact of assisted conception when examining relationships between maternal age and parenting. While observational studies have consistently found no differences between previously infertile and spontaneously conceiving mothers with regard to maternal sensitivity (for a review see Hammarberg, Fisher, & Wynter, 2008), some studies have shown that previously infertile mothers reported greater warmth and more emotional involvement with their children than their spontaneously conceiving counterparts (Golombok, 2002). The current study will consider whether mode of conception moderates the associations in the proposed model or whether the associations apply regardless of how the mother conceived.

The Present Study

The aim of the study was to examine relations between mother-infant interactive behavior and older maternal age, while also exploring the possible mechanisms by which age may impact parenting behavior, specifically through psychological maturity (hardiness) and parenting locus of control cognitions. Path analysis was used to test a model examining the direct effects of age on sensitivity and mind-mindedness, and the indirect effects of age through hardiness and parental locus of control (see Figure 1). We predicted that older mothers would be more sensitive and mind-minded in their interactions with their infants. We also anticipated that age would have an indirect effect on maternal interactive behavior via hardiness and parenting cognitions, in that older mothers would be more hardy, more hardy mothers would have a more internal locus of control with respect to parenting, and these parenting beliefs would be associated with more sensitive and mind-minded mother-infant interactions. In order to isolate the effects of age, higher education, maternal distress, and infant temperament were considered as possible confounds. Finally, we examined whether the associations in the model applied for both spontaneously conceiving women and those using fertility treatment.

Method

Participants

Participants were enrolled in a larger Australian prospective multi-site study – the [name omitted for blind review] study. Approximately equal numbers of pregnant women, both spontaneous and assisted conception, from public and private antenatal clinics and classes in hospitals and assisted reproductive technology (ART) clinics, were recruited stratified across three age groups: ‘younger’, 20–30 years; ‘middle’, 31–36 years; and ‘older’, ≥ 37 years. Older age was defined as 37 years or older, which is the age at which fertility decline accelerates (Gleicher, Weghofer, & Barad, 2007). Younger was defined as below the

median age of birth in Australia at the time of the study, which was 31 years (Australian Bureau of Statistics, 2008). Inclusion criteria were as follows: English speaking, nulliparous pregnant women, aged 20 years or older. This paper reports on a subset of participants recruited in metropolitan Sydney who consented to take part in an optional postnatal home visit.

Five hundred and nineteen eligible women in Sydney were provided with information about the [name omitted for blind review] study, 317 (61%) consented to participate, and 266 (84% of consenting women) completed all antenatal and postnatal measures. At four months postpartum, women who had given birth to a single baby ($n = 253$) were invited to participate in an additional home visit when their baby was seven months of age. Seventy percent ($n = 178$) expressed interest, with 154 (87% of interested women) subsequently completing the home visit. Due to incomplete data as a result of technical difficulties at the time of the home visit, results reported here concern 150 women and their babies.

Table 1 shows the demographic and contextual characteristics of participants by recruitment age group and mode of conception in the third trimester of pregnancy. The mean age of participants was 33.5 years ($SD = 4.8$ years, range = 26 – 43 years). Approximately 57% ($n = 86$) conceived spontaneously, 36% ($n = 54$) following ART, and 7% ($n = 10$) had other fertility treatment (fertility drugs, ovulation induction, or intrauterine insemination), but not ART. For analyses, women who conceived using either ART or other fertility treatment ($n = 64$, 43%) were grouped together as the ‘fertility treatment’ group. A small percentage ($n = 12$; 8%) of pregnancies in the spontaneous conception group were not planned. The majority of participants had a partner (97%), were university educated (66%), worked in professional occupations (78%), and spoke only English at home (80%).

Infants were 83 boys and 67 girls with a mean gestational age of 39 weeks ($SD = 1.5$); 96% of women gave birth at full term (at least 37 weeks gestation). At four months

postpartum, 99% ($n = 149$) of mothers reported their infants to have ‘good, very good, or excellent’ health, with one infant’s health rated as ‘fair’.

Procedure

After obtaining ethical approval from relevant institutional ethics committees, consenting women participated in a structured telephone interview and completed questionnaires in the third trimester of pregnancy ($M_{\text{gestation}} = 31.4$ weeks, $SD = 2.5$ weeks) and at four months postpartum ($M_{\text{babyage}} = 18.8$ weeks, $SD = 4.7$ weeks). A home visit was undertaken when infants were approximately seven months of age ($M_{\text{babyage}} = 7.22$ months, $SD = .80$ weeks) during which mothers completed a series of questionnaires on a laptop and a 15-minute mother-infant play interaction was filmed. A set of developmentally appropriate toys was provided for the play interaction including a ball, stackable plastic cups, a set of farm animals, a rattle, a soft toy, and a jack-in-the-box. Mother and infant were seated on the floor, and mothers were instructed to play with their infants as they normally would.

Measures

Participant Characteristics. Demographic (age, education, relationship, employment, language spoken at home) and reproductive history (mode of conception) information was collected in pregnancy, and birth (method, gestation) and infant characteristics (sex, birth weight) at four months postpartum.

Psychological Maturity: Hardiness. During the third trimester of pregnancy participants completed the Personal Views Survey 3rd Edition, Revised (PVS-III-R; Maddi & Khoshaba, 2001), an 18-item questionnaire designed to assess psychological hardiness. Items have a 4-point response set from 0 (*not true at all*) to 3 (*very true*) and cluster to form three subscales; commitment (being involved; e.g., “Trying your best at what you do usually pays off in the end”), control (being influential; e.g., “Most of the time, people listen carefully to what I have to say”), and challenge (continual learning; e.g., “Changes in routine provoke me

to learn”). A higher summed score of all items (range 0 – 54) indicates greater hardiness. The reliability and construct validity of the PVS-II-R has been demonstrated in a number of studies showing that hardiness is best considered a higher-order factor distinct from negative affectivity and neuroticism, unrelated to socially desirable responding, and positively associated with problem solving coping (Maddi et al., 2011). The scale has good internal consistency ($\alpha = .88$) (Maddi & Khoshaba, 2001) and reliability for the current sample was acceptable (Cronbach’s $\alpha = .76$).

Parental Locus of Control Beliefs. The Parental Locus of Control Scale (PLOC; Campis et al., 1986) was completed during the home visit. The PLOC is a 47-item scale with a 5-point response set from 1 (*strongly agree*) to 5 (*strongly disagree*) designed to assess locus of control beliefs regarding child-rearing and control orientation in the parent-child relationship. Items yield five dimensions: parental efficacy (e.g.; “What I do has little effect on my child’s behavior”), parental responsibility (e.g.; “The misfortunes and successes I have had as a parent are the direct result of my own behavior”), child control of parent’s life (e.g.; “I feel like what happens in my life is mostly determined by my child”), parental belief in fate/chance (e.g.; “Heredity plays the major role in determining a child’s personality”), and parental control of child’s behavior (e.g.; “I always feel in control when it comes to my child”). Higher total scores (range 47 – 235) indicate a more external locus of control. High internal consistency (Chronbach’ s α of .81 and .92), adequate test-retest reliability, and construct validity for the PLOC scale have been reported (Campis et al., 1986; Roberts, Joe, & Rowe-Hallbert, 1992). Reliability for the current sample was $\alpha = .76$.

Quality of Mother-Infant Interaction. Recordings of the episode of 15-minute mother-infant play were assessed independently for maternal sensitivity and mind-mindedness by two separate coders blind to participant variables and study hypotheses. A second coder assessed a randomly selected 20% ($n = 30$) of the mother-infant interactions.

Maternal sensitivity was assessed using the National Institute of Child Health and Human Development (NICHD) Qualitative Ratings of Mother/Child Interaction at 6 Months (NICHD Early Child Care Research Network, 1999), which contain two sensitivity scales, sensitivity to distress and sensitivity to non-distress. Only the sensitivity to non-distress scale was used, as few infants displayed any distress during the free play observation. The sensitivity to non-distress scale is a 4-point global rating scale of maternal behavior ranging from 1 (*not at all characteristic*) to 4 (*highly characteristic*) assessing how observant and responsive the mother is to the child's signals, with aspects of contingency, synchrony, mutuality, and appropriateness considered. The key component of sensitivity is that the interaction is child centred. Inter-rater reliability (intra-class correlation coefficient) was .82.

Maternal Mind-mindedness. A mother's tendency to comment on her infant's mental states was assessed in accordance with the Mind-Mindedness Coding Manual Version 2.0 (Meins & Fernyhough, 2010). Maternal speech during the play session was transcribed verbatim, and any comment made by the mother using an explicit internal state term to reflect what the infant may be thinking, experiencing, or feeling, e.g. "you like the toys that make noise", "you don't know what to choose", or statements speaking for the infant, e.g. "yes, I think I want the turtle" were identified as mind-minded. In accordance with the manual, mind-minded comments were then classed as either 'appropriate' or 'non-attuned' according to the coder's agreement or disagreement with the mother's interpretation of the infant's internal state from watching the recording of the interaction. Non-attuned comments were of low frequency and only appropriate mind-mindedness was considered. Two mind-mindedness scores were calculated: total number of appropriate mind-minded comments (total MM) and proportional appropriate mind-minded comments (proportional MM), calculated as a proportion of the total number of comments made by the mother. Higher scores on each indicated higher levels of appropriate mind-mindedness. The proportional

score was used in analyses in order to control for overall verbosity of mothers, as recommended in the coding manual, however the total and proportional scores were highly correlated, $r(150) = .81, p < .001$. The intra-class correlation for number of appropriate mind-minded comments was .99.

Potential Covariates

Infant Temperament. At four months postpartum, mothers completed the Short Temperament Scale for Infants (Sanson, Prior, Garino, Oberklaid, & Sewell, 1987), a 30 item scale responded to on a 6-point scale from 1 (*almost never*) to (*almost always*). The Easy-Difficult Scale is the average of three scales, approach-withdrawal (e.g., “For the first few minutes in new place or situation the baby is fretful”), cooperation (e.g., “The baby continues to fret during nappy change in spite of efforts to distract”), and irritability (e.g., “The baby continues to cry in spite of several minutes of soothing”). Higher scores suggest a more ‘difficult’ temperament. Reliability for the current sample was acceptable ($\alpha = .67$).

Maternal Distress. Assessed at the time of the home visit using the 12-item Parental Distress Scale (PDS) from the Parenting Stress Index, Short Form (PSI; Abidin, 1995). Items have a 5-point response scale from 1 (*strongly agree*) to 5 (*strongly disagree*), and assess distress experienced in the parenting role as a function of sense of competence, restriction on other roles, partner conflict, lack of social support, and depression (e.g., “I don’t enjoy things as I used to”). A higher score indicates higher distress. Reliability for the current sample was $\alpha = .83$.

Data Analysis

Preliminary analyses were undertaken to identify missing data and test for normality of continuous variables. Zero-order and point biserial correlations assessed bivariate relationships among study variables and relationships between possible confounding variables and parenting outcomes. Path analyses were conducted using AMOS with full

information maximum likelihood estimation (Version 21; Arbuckle, 2010). First, both the direct and indirect effects of age on mother-infant interaction were examined with sensitivity and mind-mindedness included as two separate outcomes in the one model. The bootstrapping procedure was used to test the indirect effects proposed (see Figure 1). Second, to investigate whether age contributes to maternal interactive behavior over and above any indirect effects via hardiness and parental locus of control cognitions, the direct effect of age on sensitivity and mind-mindedness was constrained to be zero (in separate analyses for each parenting outcome) and model fit was re-evaluated. Finally, a multi-group invariance analysis was undertaken to determine whether the relationships in the model applied equally for spontaneous conception and fertility treatment groups.

In order to overcome the sensitivity to sample size problem inherent in the chi-squared goodness of fit index, the following fit indices and criteria of a good fit were also used: χ^2/df with a value less than 2, Tucker-Lewis index (TLI) and comparative fit index (CFI) with values around .95 or greater, and root mean square error of approximation (RMSEA) with a value less than .06 regarded as acceptable (Hu & Bentler, 1999).

Results

Preliminary Analyses

Less than 5% of all questionnaire items were missing. Assumptions of normality were satisfied. The mean for maternal sensitivity (2.55, $SD = .77$) was comparable with, but slightly lower than NICHD normative data from the United States ($M = 3.01$, $SD = .74$). The mean proportion of appropriate mind-minded comments (8.05, $SD = 3.81$) was similar to that reported by Meins and colleagues in a community sample of British mothers with infants aged seven months ($M = 9.81$, $SD = 4.46$) (Meins et al., 2011) and slightly higher than the mean reported in mothers with eight month old infants ($M = 5.34$, $SD = 3.64$) (Meins et al., 2012).

Bivariate Correlations

Results of Pearson product-moment and point biserial correlations, means and standard deviations of study variables are shown in Table 2. Maternal age was significantly positively associated with hardiness and mind-mindedness, marginally associated with parental locus of control, but not associated with sensitivity. Older mothers were more likely to have conceived using fertility treatment. Hardiness was significantly associated with a more internal parental locus of control but not with sensitivity or mind-mindedness, while parental locus of control was significantly associated with mind-mindedness and marginally associated with sensitivity. There was no significant association between sensitivity and mind-mindedness. Of the potential covariates, only tertiary education was significantly associated with sensitivity and was therefore included in subsequent path analyses.

Conception after fertility treatment was associated with higher levels of hardiness. Infant temperament, maternal distress and infant gender were not associated with age, sensitivity or mind-mindedness and were not considered further, all $r_s < .1$, $p_s > .10$ (data not in Table).

Path Models

Initially, the model proposed in Figure 1 was assessed. Both direct and indirect effect of age on sensitivity and mind-mindedness were examined in the one analysis. In order to control for the possible confounding effect of maternal education on parenting behavior, education was included as a predictor of all endogenous variables (hardiness, parental locus of control, sensitivity, mind-mindedness) and co-varying with age. Results indicated that maternal age was associated with greater mind-mindedness ($\beta = .17$, $p < .05$), mothers who were older reported higher levels of hardiness ($\beta = .18$, $p < .05$), hardiness was associated with a more internal parental locus of control ($\beta = -.42$, $p < .001$), and a more external parental locus of control was associated with lower scores for maternal sensitivity ($\beta = -.17$, $p < .05$) and mind-mindedness ($\beta = -.23$, $p < .01$). Maternal age was not significantly related to

sensitivity ($\beta = -.02, p = .70$). Additionally there were significant paths between education and hardiness ($\beta = .22, p < .01$) and education and sensitivity ($\beta = .21, p = .01$).

All three tests of the indirect effect of age were significant, indicating that maternal age was associated with greater hardiness and, via hardiness, a more internal parental locus of control ($\beta = -.08, p < .01$); that maternal age was associated with a more internal parental locus of control and, via locus of control, higher scores for sensitivity ($\beta = .01, p < .05$) and mind-mindedness ($\beta = .02, p < .01$). Additionally, there was a significant indirect effect of hardiness, in that mothers with greater hardiness had a more internal parental locus of control and, via locus of control, higher scores for mind-mindedness ($\beta = .10, p < .01$), and marginally greater sensitivity ($\beta = .07, p = .07$). The fit indices for this model were acceptable; $\chi^2(4) = 3.39, p = .50$; $\chi^2/df = .85$; TLI = 1.04; CFI = 1.00; and RMSEA = .00 (90% CI [.00, .12]).

In order to investigate whether the direct effect of age on parenting behavior added any explanatory variance over and above the indirect effect of age via psychological maturity and parenting cognitions, direct age effects were constrained to be zero and model fit re-evaluated in separate analyses for each parenting outcome (sensitivity and mind-mindedness). Constraining the direct effect of age on sensitivity did not result in a significant worsening of model fit, $\Delta\chi^2(1) = 0.06, p = .81$, and this restraint was therefore accepted. However, constraining the direct effect of age on mind-mindedness resulted in significant worsening of model fit, $\Delta\chi^2(1) = 4.71, p < .05$, and this restraint was not retained. The fit indices for the final model without a direct age effect on sensitivity, but retaining the direct path between age and mind-mindedness were as follows: $\chi^2(5) = 3.45, p = .63$; $\chi^2/df = .69$; TLI = 1.10 CFI = 1.00; and RMSEA = .00 (90% CI [.00, .09]). The indirect effects of age and hardiness

remained significant and unchanged from the initial model evaluated. Figure 2 shows results for this model with standardised coefficients.

Finally we tested whether the model applied for both modes of conception (spontaneous or fertility treatment) by undertaking an invariance analysis in AMOS. Structural paths in the final model including education as a covariate were constrained to be the same for each mode of conception group and model fit was compared with a model where the paths for each group were not constrained but were free to vary. The global chi-square values were not significantly different between the constrained and unconstrained models, $\Delta\chi^2(9) = 10.19, p = .34$, suggesting the model performed similarly across mode of conception groups. Fit statistics for the constrained model were as follows: $\chi^2(19) = 21.55, p = .33$; $\chi^2/df = 1.14$; TLI = .92; CFI = .95; and RMSEA = .03 (90% CI [.00, .08]).

Discussion

Given the changing demography of parenthood, older maternal age has re-emerged as a focus when examining the determinants of parenting (Schlomer & Belsky, 2012). Results from the current study suggest that older maternal age contributes to parenting in infancy indirectly through psychological maturity (hardiness) and its effect on parenting cognitions, specifically a more internal locus of control with regards to parenting, which is associated with greater attunement to the infant (assessed here as greater sensitivity and mind-mindedness). Age is also directly related to mind-mindedness, a mother's ability to appropriately articulate her infant's likely emotional and cognitive experience. These associations applied after controlling for the effect of education and regardless of mode of conception. Both age and psychological maturity are, therefore, important contributors to the quality of maternal interactive behavior.

Maternal Age and Parenting

The direct association between maternal age and mind-mindedness is consistent with previous results (Demers et al., 2010b; Meins et al., 2013) and extends findings to mothers at the older end of the childbearing age spectrum. Interestingly, maternal age contributed to mind-mindedness over and above the indirect effect of age via the psychological characteristics (hardiness, parenting cognitions) considered in this study. This suggests that other factors related to age may enable a mother to recognise and comment appropriately on her infant's internal experience.

Contrary to prediction, there was no direct association between maternal age and sensitivity. Previous findings generally support relations between increasing age and sensitive parenting (e.g., Bornstein et al., 2006; Broom, 1994), although this association has not always been found (Bernier et al., 2010). Our divergent finding may be due to the socio-demographic characteristics (generally high across all age groups) and age range of participants (26 to 43 years), given previous research has usually included teenage mothers and more socio-demographically diverse samples. Two-thirds of participants were aged over 30, and participants, even younger mothers, were predominantly tertiary educated and in professional occupations. Previous findings by Bornstein and colleagues (Bornstein & Putnick, 2007; Bornstein et al., 2006) showed that associations between maternal age and sensitivity were not consistent across the full maternal age range with a lack of association found after age 30. Additionally, inconsistencies in how sensitivity is defined and assessed make between-study comparison difficult.

The lack of a significant association between mind-mindedness and sensitivity was contrary to theoretical prediction and to prior research using the observational mind-mindedness measure in infancy. Although some studies using an interview measure of mind-mindedness have not found significant associations with sensitivity (McMahon & Meins, 2012), the majority of studies using appropriate mind-minded comments assessed from

observations report significant but modest correlations with sensitivity using the Ainsworth sensitivity scale (e.g., Meins et al., 2011; Meins et al., 2012) and the Maternal Behavior Q-Sort (Demers et al., 2010a; Laranjo et al., 2008). Measurement issues may explain the null finding as in the current study the NICHD scales were used to assess sensitivity and these four point scales yield less variance in scores compared with the nine point Ainsworth scale (Ainsworth, Bell, & Stayton, 1974) and the comprehensive assessment based on 90 observed maternal behaviours in the Maternal Behavior-Q Sort (Pederson & Moran, 1995).

Although Meins and colleagues suggest that mind-mindedness and sensitivity tap similar aspects of sensitive responsiveness, they also acknowledge that they are distinct aspects of mother-infant interaction, can operate independently, and that verbal comments are one of several ways in which a mother can show her recognition of her infant's internal state (Meins, 2013; Meins et al., 2011). It was noted in the current study that some mothers demonstrated high behavioral indices that they recognised their infant's interests or preferences without explicitly stating this. Nevertheless, age was indirectly related to both aspects of maternal interactive behavior (sensitivity and mind-mindedness) and to parental locus of control through the relation with hardiness.

Psychological Maturity, Parenting Cognitions and Parenting Behavior

Sameroff and Feil (1985) suggest that a parent's complexity of developmental thought, which influences interpretation of child behavior and, by extension, parental behavior, ranges from simple and more concrete to an increasingly broad transactional perspective. Current results support this idea in that the older, more psychologically mature mother holds parenting beliefs that directly contribute to an overt appreciation of her infant's internal experience (mind-mindedness) and responsive maternal interactive behavior.

Findings regarding an association between maternal age and hardiness replicate results from the larger study from which this sample was drawn (see reference removed for

blind review, 2014), as well as from previous research (McMahon et al., 2007). In the current study, although older maternal age was related to higher levels of hardiness, a characteristic believed to enable perspective taking and flexibility (Kobasa et al., 1982), hardiness did not directly predict parenting behavior. This is somewhat surprising given previous findings of relations between psychological maturity, assessed using a range of constructs, and parenting (Belsky & Barends, 2002). As psychological maturity has been shown to impact adaptation to early parenthood (reference removed for blind review, 2014; Heinicke, 1984) it may be that hardiness provides advantages for parenting at an earlier time point, with any differences attenuating by seven months postpartum when mothers are more established in the parenting role, and when infants are more regulated and better able to communicate and interact with caregivers. Results from previous studies also show that maturity is often predictive of different dimensions of parenting behavior (e.g., warmth, stimulation, expressivity), and that only some personality traits predict parenting quality (Belsky & Barends, 2002; Bornstein, Hahn, & Haynes, 2011; de Haan et al., 2009). This makes reconciling findings difficult and also suggests that hardiness may directly impact other aspects of parenting behavior not examined in the present research.

As noted, associations between hardiness and parenting were indirect via parental locus of control, with higher scores for hardiness in pregnancy facilitating a greater sense of efficacy and internal control with respect to parenting when infants were aged around 7-months. Hardiness, like parental locus of control, focuses on the tendency to feel and act as if one has a definite influence (Kobasa et al., 1982). This finding provides support for the assumption that hardiness enables adaptation to changing environments through the effects of cognitive appraisals (Gramzow et al., 2000), and also empirically confirms the suggestion that perception of control with respect to parenting outcomes stems from parental personality (Hagekull et al., 2001). This later result contributes to the understanding of the psychological

mechanisms by which parental characteristics impact parenting (Belsky & Barends, 2002; Bornstein, Hahn, & Haynes, 2011; de Haan et al., 2009).

Mothers who appraised child developmental outcomes as a consequence of their own parenting efforts were more sensitive and made proportionally more mind-minded comments when interacting with their infants. While the first finding is consistent with previous results (Bornstein et al., 2007; Teti et al., 1996), a relationship between mind-mindedness and parenting beliefs has not previously been explored to our knowledge, and this latter finding supports the proposition that mind-mindedness stems from a mother's appraisal of her relationship with her child (Meins et al., 2011). In a recent study, Meins et al. (2014) suggest that mind-mindedness is not a trait but a relational construct that applies to representations of individuals with whom one has a close personal relationship. Current findings are consistent with this conceptualization, as mind-mindedness was not directly related to hardiness (a trait), whereas mind-mindedness was associated with cognitions specific to the parent-child relationship.

Current findings also suggest that parenting interventions could be targeted at the level of personality dispositions as well parenting cognitions directly. Hardiness has been shown to be responsive to a training procedure emphasising effective coping, social support, and beneficial self-care that successfully increases hardiness and reduces ongoing strain (Maddi, 2002; Maddi et al., 2011). This perhaps might benefit younger mothers or those at risk of parenting difficulties to develop internal resources that may strengthen beliefs regarding their parenting efficacy and the impact of responsive parenting behaviors for child development outcomes.

Results showing an association between higher education and higher levels of maternal sensitivity, but not mind-mindedness, even with the effects of age, maturity, and parenting cognitions included in the model, are largely consistent with previous findings.

Education is related to a more sophisticated cognitive orientation (Bornstein et al., 2007), which may help explain why mothers with tertiary education are better able to read their infant's signals and respond in a sensitive way. Despite maternal education being related to interactional style through linguistic responsiveness (Garrett, Ferron, Ng'Andu, Bryant, & Harbin, 1994), tertiary education does not appear to impact mind-mindedness in the same manner, with current null findings consistent with reports from several studies (McMahon & Meins, 2012; Meins et al., 2011). The finding of a lack of association between infant temperament and mind-mindedness replicates in a larger sample Meins et al.'s (2011) results and lends further support to the characterization of mind-mindedness as a maternal quality, rather than a response to specific infant characteristics.

Results suggesting that the relationships in the model applied to both mothers who conceived spontaneously and those conceiving after fertility treatment are also consistent with previous findings indicating comparable mother-infant interactive behavior between previously infertile and spontaneously conceiving mothers in the first year of parenthood (Hammarberg et al., 2008). Although at the univariate level there were no significant associations between mode of conception and parental locus of control beliefs, maternal sensitivity and mindedness, due to the small number of participants in each mode of conception group for the purpose of the invariance analysis, results should be interpreted cautiously until replicated in a larger sample.

Limitations and future directions

The homogenous nature of the sample limits the generalizability of results to English-speaking, socio-economically advantaged women living in a metropolitan area. However, as this study investigated the effects of first-time motherhood at older ages in a sample of participants that excluded teenage mothers and oversampled mothers in the older age

spectrum, the findings with regard to age are robust and sample characteristics (educated, partnered, professional) are typical of older first-time mothers (Bornstein & Putnick, 2007; Carolan & Frankowska, 2011; Schmidt et al., 2012).

A further limitation was restricting observations of parenting to a single, relatively short, non-stressful play episode. Mothers were able to devote all their attention to infant activities whereas a longer naturalistic observation or more realistic high demand situation may be a more valid approach (Laranjo et al., 2008). Furthermore, the mechanisms linking maternal age and sensitivity to distress may differ from those examined in the current model, which was limited to considering sensitivity to non-distress. Future research using a more challenging mother-infant interactive task, such as the still-face procedure, to elucidate some distress in the infant could examine similarities and difference in factors involved in maternal responses to distress and non-distress.

Additionally, the reliance on maternal self-report measures of predictors of parenting behavior is potentially limiting, however measures were completed at different time-points, and findings in line with theorized associations suggest these assessments were valid. Hardiness has been shown to be unrelated to socially desirable responding (Maddi et al., 2011), and the moderate correlation between hardiness and parental locus of control, and the fact that only parental locus of control was directly associated with parenting, suggest these constructs are distinct. Future studies using observational measures of infant temperament and alternate measures of psychological maturity and parenting cognitions may further clarify the relationships between maternal and infant characteristics and parenting in infancy. Future research might also focus on the role of other contextual factors such as marital quality, social support, financial security, and life/career satisfaction in explaining the link between age and parenting, especially given current findings of a direct relation between age and mind-mindedness over and above the personal characteristics examined in this study.

Conclusion

The findings of this study contribute to a growing body of research regarding the unique impact of chronological age on maternal parenting behavior (Bornstein et al., 2006; Ragozin et al., 1982). Age has direct and indirect relations with different aspects of parenting in infancy even after controlling for socio-demographic factors. Results provide empirical support for the notion that older mothers are more psychologically mature and that this maturity is associated with adaptive parenting cognitions that in turn directly contribute to more sensitive and mind-minded mother-infant interactions. Additionally, irrespective of maturity or parenting cognitions, older mothers have a tendency to make more mind-related comments regarding their infant's likely internal states. Given the importance of maternal sensitivity and mind-mindedness for children's development (Bornstein, Hahn, Suwalsky, et al., 2011; Meins, 2013), current findings suggest that older maternal age provides some psychosocial benefits to offspring in early childhood.

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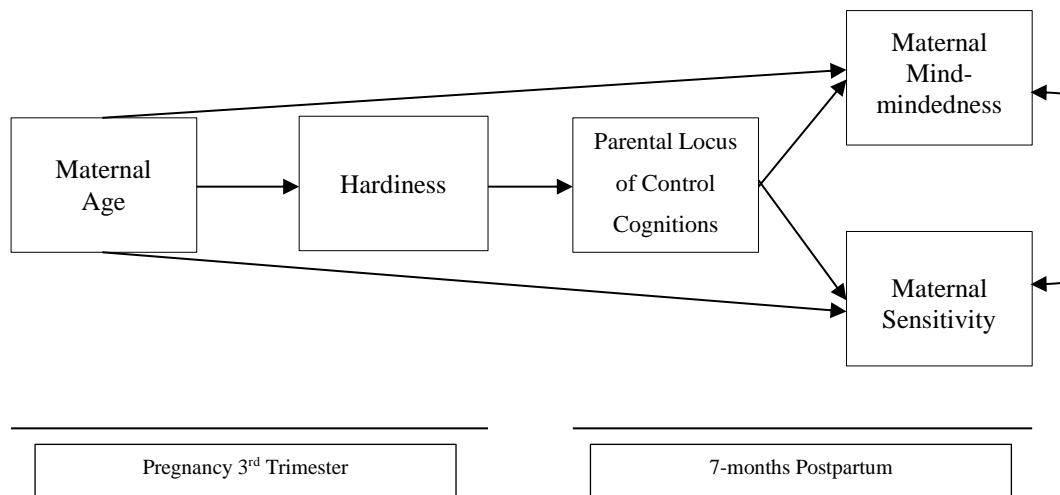


Figure 1. Model of proposed relations among maternal age, hardiness, parental locus of control cognitions, and maternal sensitivity and mind-mindedness.

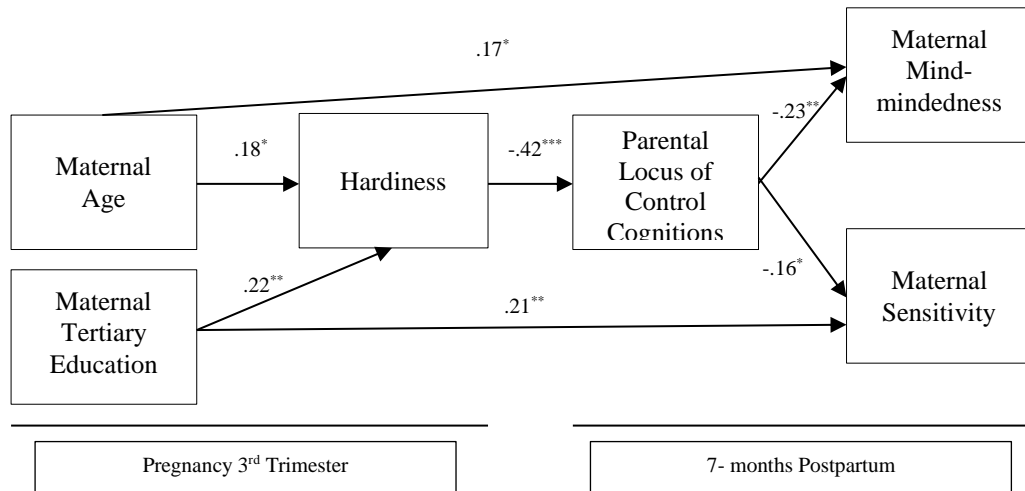


Figure 2. Path analysis showing final model with standardised coefficients for significant paths, controlling for maternal education. Fit statistics: $\chi^2(5) = 3.45, p = .63$; $\chi^2/df = .69$; TLI = 1.10 CFI = 1.00; and RMSEA = .00 (90% CI [.00, .09]).

Note. Higher scores on Parental Locus of Control Cognitions indicate a more external locus of control.

* $p \leq .05$. ** $p \leq .01$. *** $p < .001$.

Table 1

Participant Demographic and Contextual Characteristics by Recruitment Age Group and Mode of Conception Group

		Age Group ≤ 30 n = 49	Age Group 31-36 n = 53	Age Group ≥ 37 n = 48	Total Sample N = 150	Spontaneous Conception n = 86	Fertility Treatment n = 64
Age ^{1 2}	M (SD)	28.02 (1.39)	33.43 (1.85)	39.02 (1.76)	33.45 (4.74)	31.77 (4.34)	35.72 (4.32)
Tertiary education	n (%)	31 (63%)	38 (72%)	30 (63%)	99 (66%)	56 (65%)	43 (67%)
Partnered	n (%)	49 (100%)	51 (96%)	46 (96%)	146 (97%)	83 (97%)	63 (99%)
English-only at home	n (%)	40 (82%)	42 (79%)	38 (79%)	120 (80%)	70 (81%)	50 (78%)
Professional Occupation	n (%)	34 (69%)	43 (81%)	39 (83%)	116 (78%)	63 (73%)	53 (84%)
Fertility treatment ^{1 a}	n (%)	10 (20%)	22 (42%)	32 (67%)	64 (43%)	–	–

Note. Age range of participants 26 – 43 years. ¹ Age groups differ at $p < .01$; ² Mode of conception groups differ at $p < .01$; ^a Due to sampling strategy proportion not representative of general population.

Table 2

Correlation Matrix and Means (M) and Standard Deviations (SD) of Study Variables

Variable	1	2	3	4	5	6	M	SD
1. Age	-						33.45	4.74
2. Hardiness	.18*	-					40.63	5.27
3. Parental locus of control	-.14 [†]	-.39***	-				116.12	12.07
4. Mind-mindedness	.20*	.05	-.25**	-			8.05	3.81
5. Sensitivity	.00	.11	-.15 [†]	-.03	-		2.55	.77
6. Tertiary education (0=no,1 = yes)	-.01	.22**	.04	.08	.21*	-	—	—
7. Fertility treatment (0 = no, 1=yes)	.41***	.17*	-.10	.05	.05	.02	—	—

[†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.