DOCTORATE IN CLINICAL PSYCHOLOGY

Literature Review

The Association Between Maternal Sensitivity and Child Temperament Development

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“I certify that all maternal in this literature review which is not my own work has been identified and properly attributed. I have conducted the work in line with the BPS DCP Professional Practice Guidelines.”

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Abstract

This review examines literature on the association between maternal sensitivity (MS) and child temperament and highlights future directions for research. There is evidence that temperament has biological underpinnings and may be influenced by MS. This relationship is thought to be bidirectional. Earlier studies looking at the association between maternal sensitivity and child temperament development provide some support for the hypothesis that lower levels of MS are associated with more difficult temperaments. However, the results are subject to methodological limitations, including lack of adjustment for confounding variables, low statistical power to detect effects and lack of generalisability. There is some evidence that MS plays a role in shaping the development of temperament in early childhood. Since difficult temperament in childhood has been linked to an increased risk of future psychological problems, it is important to increase understanding of factors in early life that influence the development of temperament.

KEYWORDS Maternal Sensitivity, Temperament, Infant, Child Development
Introduction

This review critically appraises the research literature examining the association between Maternal Sensitivity (MS) and child temperament. It will begin by defining temperament, considering temperament measurement and examining its association with life functioning. The review will discuss research examining the environmental factors associated with temperament development. The paper will focus on MS as an important environmental influence, providing a definition of MS and discussing the theoretical explanations for an association. The review will then critique the evidence base investigating the association between MS and temperament within clearly defined inclusion and exclusion criteria. This critique will include a discussion of their findings and consider methodological limitations. Finally, the review will draw conclusions and make recommendations for future research.

Temperament

Determining a widely accepted definition of temperament and its constitutional dimensions from the literature is difficult, however a number of common themes emerge. A concept review by Zentner and Bates (2008) suggests that temperament refers to individual differences in normal behaviours in the domains of affect, activity, attention and sensory sensitivity that are typically expressed in formal characteristics such as response intensity, duration, threshold and recovery time. They highlighted the close and complex link to biological mechanisms (e.g. neurochemical, neuroanatomical, genetic) and the existence of counterpart traits in primates and other social mammals. Finally, Zentner and Bates (2008) suggest that temperament traits should appear in the first few years of life, with patterns of responses fully identifiable from preschool age, which are relatively enduring and predictive of conceptually coherent child outcomes.
Nigg (2006) further defines temperament as higher order patterns of individual differences in reactivity to immediate incentive contexts as well as their mutual regulation. Temperament can therefore be thought of as levels of reactivity and self-regulation (Rothbart & Derryberry, 1981). Reactivity refers to the degree of arousability an individual has in response to stimuli, measured by the intensity, speed, escalation and duration of this reaction. Self-regulation is the control exerted to bring about an appropriate behavioural response through the use of approach/avoidance, attentional control and inhibition of emotions (Rothbart & Bates, 2006). It is the interaction between these primary components that contributes to the individual differences in behaviour that are driven by temperament (Belsky, Friedman & Hsieh, 2001). However Nigg (2006) also suggested that lower order constituent traits make up the higher order umbrella and it is the exact nature and number of these constituent dimensions on which theorists often disagree.

A nine-dimensional theory of temperament was originally proposed by Thomas, Chess, Birch, Hertzig and Korn (1963) through their work on the New York longitudinal studies. Thomas et al. (1963) carried out content analysis of parental interviews to derive the dimensions of; Activity, Rhythmicity, Approach, Adaptability, Threshold, Intensity, Mood, Distractibility and Persistence. Of note, Thomas et al. (1963) highlighted that the behaviours that lead to individual differences across the dimensions are influenced by parental and cultural values, therefore emphasizing the important role of environmental influence on temperament development. In later work, Buss and Plomin (1975) endorsed a four-dimensional model that included emotionality, sociability, activity and impulsivity, while Goldsmith and Campos (1982) expanded emotionality to include positive in addition to negative emotionality (NE). Furthermore, they emphasized not only the role of emotion in temperament, but also the construct of emotion regulation. This relationship is also highlighted by Rothbart and Derryberry (1981) who suggested three broad dimensions of
temperament. These include; a) surgency/extraversion (e.g. positive anticipation, activity level and sensation seeking) b) negative affectivity (e.g. fear, anger-frustration and social discomfort) and c) effortful control (e.g. inhibitory control, attentional focus and perceptual sensitivity), which is exhibited through their capacity to inhibit a dominant response in favour of a subdominant one (Poser & Rothbart, 2007; Rothbart & Bates, 2006).

Goldsmith, Rieser-Danner and Briggs (1991) suggest that difference between definitions reflects the different boundaries of constructs within the approaches. Block (1995) refers to this as the “jingling and jangling fallacy” whereby the same term has multiple meanings and where different terms have the same definition. Despite this, research has shown commonalities between temperament measurements (Rothbart & Mauro, 1990). Nigg (2006) suggests therefore, that while the exact nature and number of lower order dimensions of temperament are debated within the literature, the higher order umbrellas are more generally accepted.

**Measurement.** Given the wide concept of temperament, there are a number of ways in which temperament is measured. Most commonly, this is through parental interview, researcher observation either in their own environment or a laboratory setting and/or mother-report questionnaires. Given the associated difficulties with conducting lengthy interviews, questionnaires are often used as an alternative to determine parental ratings of particular behaviours related to the temperament dimensions. This allows for the development of standardized questionnaires and for individual temperament profiles to be compared with established norms. Observations have an advantage in that they allow objective observers to watch temperamental expressions as they occur. However, observations may still be subject to observer bias and observations are limited to discrete snapshots of the child’s current state, rather than a description of more stable behavioural characteristics over different times and in different settings. Use of maternal report
measures therefore rely on judgments of their child’s overall traits across multiple settings but can be confounded by the mother’s own mental state (e.g. depression) (McGrath, Records & Rice, 2008; Parade & Leerkes, 2008).

**Association between Temperament and Life Functioning**

Temperament is an important predictor of functioning in later life (Propper & Moore, 2006), including the risk of developing adverse mental health problems such as internalising and externalising disorders (Kagan & Snidman, 2004), delinquency (Windle, 1992) and substance misuse (Mun, Fitzgerald, Von Eye, Puttler & Zucker, 2001). Temperament is strongly associated with social functioning, including the development of prosocial capacities (e.g. conscience, empathy and the adaptation of behaviour to suit social contexts) (Sanson, Hemphill & Smart, 2004). Temperament is related to later individual differences in personality (Caspi, et al., 2003) and academic success (Posner & Rothbart, 2007).

**Association between Environmental Factors and Temperament**

Research is increasingly showing that neural development (Johnson & Mareschal, 2001) and gene expression are shaped by early experiences (Weaver, 2009). Gottlieb & Halpern (2002) suggest that it is the interaction between these factors that drives child development. Temperament is subject to change through maturation and experience (Rothbart & Bates, 2006). This could explain why temperament has been found to have only moderate stability in infancy (e.g. Matheny & Philips, 2001; Rothbart, Derryberry & Hershey, 2000), with greater stability after 24 months of age (e.g. Kochanska, 2001).
Maternal behaviours also play an important role in shaping child temperament (Kochanska, Aksan & Joy, 2007) and maternal sensitivity (MS) is an important indicator of the quality of this maternal behaviour.

**Maternal Sensitivity**

MS refers to “the quality of a mother’s sensitive behaviours that are based on her abilities to perceive and interpret her infant’s cues and respond to them” (Shin, Park, Ryo & Seoman, 2008). It is defined as the warm and appropriate maternal responses towards an infant’s communications and emotional cues (Ainsworth, Blear, Waters & Wall, 1978), including appropriate affect, flexibility and acceptance (Van Doesum, Hosman, Riksen-Walraven & Hoefnagels, 2007). Shin et al. (2008) suggest that MS is often used interchangeably with the term “maternal responsiveness”. Meins, Ferneyhough, Fradley and Tuckey (2001) differentiate between these terms suggesting that maternal responsiveness refers only to the maternal responses to the infant’s physical and emotional needs, while MS further considers the quality of their responses. This interchangeable use however, led to its inclusion as an additional search term to ensure all relevant articles were found.

The concept of MS is independent of attachment, in that attachment refers specifically to the affectional bond between a child and their caregiver (Bowlby, 1969), while MS refers only to maternal behaviour. Research has shown however, that MS is associated with greater attachment security (eg. Bigelow et al. 2010). There is also evidence for an association between MS and areas of child development (Crittenden & Bonvillian, 1984). This includes cognitive (Pearson, et al. 2011) and socio-emotional development (Page, Wilhem, Gamble & Card, 2010). MS is also associated with infant reactivity and self-regulation (Propper & Moore, 2006), which are central to temperament
(Rothbart & Derryberry, 1981). This may be because an infant’s difficulty regulating their own physiological arousal means that they rely on their caregivers (Sroufe, 2000) to alleviate negative emotions and reinforce positive emotions (Thompson, 1994). Development therefore occurs through reciprocal transactions between the child’s characteristics and environmental factors, including maternal characteristics (Hinshaw, 2008).

**Theoretical Background**

The Mutual Regulation Hypothesis builds on the idea of reciprocity between child and caregiver (Tronick, Cohn & Shea, 1986). Tronick et al. (1986) suggest that infants seek out interactions with their caregivers to regulate distress and to promote positive emotions. If these are responded to with sensitivity, distress is soothed and thus the behaviour is reinforced, allowing the infant to develop a sense of control over their emotional experience. Conversely, inappropriate or inconsistent mothering is thought to lead to a tendency for infants to react negatively to emotional challenge and to fail to develop adequate skills in self-regulation. Tronick et al. (1986) therefore highlight a mother’s influence over her child’s temperament development through sensitive responding, as well as the influence that a child’s behaviour has on her ability to respond. This relationship is thought to be bi-directional with the child’s temperament also influencing the mother’s level of MS (Leerkes & Crockenberg, 2002). A successful interaction between the mother-infant dyad may depend on complimentary responses or “goodness of fit” (Thomas & chess, 1977) for a positive cycle of mutual influence to develop (Kiff, Lengua & Zalewski, 2011).
Association between MS and Temperament

Search method. A full systematic review was not feasible given time and resource limitations, and therefore a narrative review was conducted. A structured search strategy was used, as described below, and researcher discretion was used to determine whether articles were relevant. A search was carried out using PsychINFO, ISI Web of Science and PubMed databases. The search terms were “Maternal Sensitivity” AND “Temperament”. The search terms “Maternal Responsiveness”, “Maternal Competency”, “Negative Emotionality”, “Positive Emotionality”, “Effortful Control”, “Maternal Warmth” and “Emotion Regulation” were also used. To detect papers not identified by the search, reference and citation lists in identified articles were also searched.

Given the substantial number of articles relating to parenting and elements of temperament, a number of inclusion criteria were applied. Studies must:

1) Be published in a peer-reviewed journal.

2) Measure maternal sensitivity to non-distress as opposed to sensitivity to distress, due to potentially different impacts on temperament (Leerkes, Blankson& O’Brien, 2009).

3) Use a longitudinal design, with MS assessed prior to child temperament.

4) Consider temperament as a whole construct. A number of articles examined self-regulation without also measuring reactivity, which is central to temperament.

5) Use behavioural measures of temperament that assess observable reactions and responses to stimuli, rather than biological expressions of temperament (Propper& Moore, 2006).

6) Studies were excluded from the review if they used a clinical population in either children (e.g. premature, adopted) or adults (e.g. alcohol or drug populations) as extreme groups may indicate larger effects than would be expected in the general population (Rothbaum& Weisz, 1994).
The search yielded 370 studies, of which 12 met the inclusion criteria and examined the association between MS and child temperament. Articles were assessed for quality, focusing specifically on study design, methods of assessing MS and temperament, sample size and adjustment for confounding variables. A summary of this information is provided in Table 1.
Table 1. Table showing Study design, sample composition, maternal sensitivity measurement, temperament measurement and confounders adjusted for in the 12 studies in focus.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Sample composition</th>
<th>Maternal Sensitivity Measurement</th>
<th>Temperament Measurement</th>
<th>Confounding variables controlled for</th>
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<tr>
<td>Van den Boom (1994)</td>
<td>Experimental – observed pre-intervention (6 months), post intervention (9 months) and follow-up (12 months).</td>
<td>100 mother-infant dyads (50 intervention group, 50 controls) All Caucasian, first born, lower SES. Normal pregnancy and birth.</td>
<td>Mothers observed in two home visits at 6 months interacting with their child. Rated maternal responsiveness to distress and responsiveness to infant’s social signals.</td>
<td>Rated temperament, attention span and level of attention when observing the child in free-play with a toy of choice.</td>
<td>None.</td>
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<tr>
<td>Fish, Stifter&amp;Belsky (1991)</td>
<td>Longitudinal – 2 time points (within 85 hours of birth and 5 months)</td>
<td>83 dyads The majority were married mothers (87%), Caucasian (98%), ranged from 16-42 years, well educated.</td>
<td>Free-play and peek-a-boo task rated for sensitivity (e.g. appropriate, contingent responses) and intrusiveness (e.g. overly stimulating, controlling, ill-timed behaviour).</td>
<td>Neo-natal = Ratings of emotionality during pacifier withdrawal and rubber band snap.</td>
<td>None.</td>
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<td>Kivijarvi, Raiha, Kalionen, Tamminen &amp; Phia (2005)</td>
<td>Longitudinal – 3 time points (3, 6 and 12 months)</td>
<td>56 dyads; Mothers had to have 12 years education, good SES, between 20 and 40 years old, parents living together.</td>
<td>Parent-child early relational assessment (PCERA) scale (Clark, 1980, 1985), rating parental behaviour, infant behaviour and dyad interaction.</td>
<td>R-ITQ (Carey &amp; McDevitt, 1978) at 6 months and Toddler Temperament Scale (TTS, Fullard, McDevitt &amp; Carey, 1984).</td>
<td>Gender and birth order.</td>
</tr>
<tr>
<td>Siepak (2008)</td>
<td>Longitudinal – 2 time points (6 and 16 months)</td>
<td>70 dyads; Majority Caucasian (77%), mean maternal age = 28.2, 66% completed University degree, 94% married or living with partner.</td>
<td>Interactions rated for intrusiveness, mismatched affect, negative behaviour, withdrawal, distracted from infant, persistent ineffective, monitor, calming contact, supportive, task focused, engagement non-task, rated 1-3 (1=insensitive, 3=sensitive).</td>
<td>LAB-TAB (Goldsmith and Rothbart, 1996) protocol to observe temperament. Subscales of Infant Behavior Questionnaire-Revised (IBQ-R, Garstein &amp; Rothbart, 2003) and Toddler Behaviour Questionnaire at 16 months (TBAQ, Goldsmith, 1996) to look at reactivity.</td>
<td>Gender, Maternal ethnicity, maternal education and income.</td>
</tr>
<tr>
<td>Authors</td>
<td>Design</td>
<td>Sample composition</td>
<td>Maternal Sensitivity Measurement</td>
<td>Temperament Measurement</td>
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| Belsky, Fish & Isabella (1991) | Longitudinal – 3 time points (within 10 days of birth, 3 months and 9 months). | 148 dyads                               | Assessed using method outline in Isabella et al. (1989). Exchanges rated as sensitive/complimentary, insensitive/poorly coordinated or neutral. | Neonatal behavioural Assessment Scale (NBAS) completed by trained examiner within 10 days of birth.  
Negative emotionality – rated crying responses and fussy/difficult subscale of ICQ. | Marital Quality, maternal personality, parents psychological health (interpersonal affect and self-esteem). |
| Owens, Shaw and Vondra (1998) | Longitudinal – 2 time points (12 and 18 months) | 213 dyads                               | Adaptation of No toys task (Smith & Pederson, 1988) coding for appropriate and contingent maternal responses to infant behaviours. | Recorded amount of time spent fussing and crying over 70 minute videotape. | Maternal social-support. |

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<td></td>
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<td>84% Caucasian, Mean education years = 14, 81% of parents married.</td>
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Current Research

There were a number of similarities in design across the studies. Van den Boom’s (1994) study used an experimental design, while all other studies examined prospective relations between MS and child temperament. In addition, all studies considered an earlier measurement of temperament within their analyses, with the exception of Owens, Shaw & Vondra (1998). However, with the exception of two studies (Kivijarvi, Rahia, Kalionen, Tamminen & Phia’s, 2005; Blandon et al., 2010) temperament was measured using different scales or types of assessment across the time points. Given the similarities in design across the studies, they were organised by the age of the sample to reflect the importance of developmental stage when examining temperament development.

Infancy. Infancy may represent a time where there is less stability in temperament (Rothbart et al., 2000) and where children are more dependent on their mothers for regulation, therefore making them more susceptible to the impact of MS. Van den Boom’s (1994) research used an experimental design, randomly allocating 50 mother-infant dyads to a 3-month intervention to enhance MS, with the remaining 50 dyads forming a control group. The intervention focused on enhancing maternal sensitive responsiveness and helping them to adjust their behaviour to their child’s unique cues. Children in the intervention group were significantly more able to self-soothe and engage in cognitively sophisticated exploration than control infants following the intervention, while ratings of MS also increased.

Fish, Stifter & Belsky (1991) investigated the association between MS and emotionality in infants from birth to 5 months and found that higher levels of MS were associated with lower levels of infant crying and social responsiveness. Belsky et al. (1991) examined children from birth to 9 months and found that infants who remained high in NE had mothers who were high in sensitivity, while mothers of infants who had increased in positive emotionality showed lower MS. Belskyet al. (1991) suggest that this is because
mothers who are too sensitive to their child’s needs do not provide opportunities for them to develop their own regulatory abilities. This also highlights the importance of considering temperament prior to MS assessment as NE remained high even in infants who had mothers with high MS.

Pauli-Pott, Mertesacker and Beckmann (2004), Siefer, Schiller, Sameroff, Resnick and Riordan (1996) and Kivijarvi et al. (2005) investigated children aged between 3-4 months to 12 months. Pauli-Pott et al. (2004) looked more specifically at positive and negative emotionality development, finding that high MS was associated with lower NE, frustration and fear at 12 months, independently of maternal depression and/or anxiety. However, they did not find evidence for an association between MS and positive emotionality. Conversely, Kivijarvi et al. (2005) found that children with mothers rated as high in MS had high scores of positive mood and sociability and lower activity levels. Seifer et al. (1996) also looked at a number of temperament dimensions including “mood”, “approach”, “activity”, “intensity” and “total difficulty”. They found that less difficult observed temperament was significantly associated with high MS. These findings specifically related to “mood” and “approach” at 6 and 9 months, and “intensity” and “total difficulty” at 9 months.

Siepak (2008) found no association between MS and temperament when examining children aged 6-16 months. They suggest however, that this might be because the sample size was too small to detect an effect of MS on temperament. The literature therefore suggests that there may be an association between some dimensions of temperament in early infancy and MS. This association may particularly relate to NE or mood, sociability, intensity and ability to self-soothe, with contrasting findings about the possible association with positive emotionality. The research also introduces the idea of mothers being too responsive to their child’s needs. However, the relative instability of temperament in early infancy (Rothbart et
al., 2000) makes differentiating between the impact of MS and natural temperament maturation difficult.

**Toddlerhood.** 9-15 months represents a time when children increasingly gain a sense of independence exploring their environment on their own (e.g. crawling, walking) and with increased connectedness with others (Sander, 1969). These increasing demands may invoke a negative response from caregivers (Rothbart, 2011). In addition, the relative plasticity of temperament at this time (Kochanska, 2001) may indicate a time when temperament is particularly vulnerable to MS. However, only two identified studies examined this stage of development.

Glogger and Pauli-Pott (2008) examined the development of fear-regulation in children from 4-30 months. They found that children with mothers high in MS showed more active regulation behaviours than children of less sensitive mothers. These included self-soothing and active avoidance techniques, such as rubbing their hands while looking at the fear stimulus. Similarly, Owens, Shaw and Vondra (1998) found that high MS was associated with reduced irritability in children aged 18-months when irritability was measured observationally. However, they found no prospective relations between MS and irritability and instead the significant associations in this study relate only to concurrent relations. The relatively little research available during toddlerhood indicates a possible change in the child’s active self-soothing abilities which may be increased through the modeling of mothers high in MS. However, as these studies focused particularly on irritability and fear-regulation as opposed to more inclusive measures of temperament, it is not possible to draw conclusions about the association between MS and other aspects of temperament at this developmental stage.

**Early-middle childhood.** By childhood, temperament is thought to have higher stability (Kochanska, 2001) however an association between MS and temperament is still
evident. Spinrad, et al. (2012) examined children aged 18-54 months using path modeling to compare models of projected temperament with models that included MS. They found evidence for an association between high MS at 30 months and high effortful control (EC) at 42 months. In addition, they suggest that an association between MS at 18 months and low impulsivity a year later may be mediated by EC. Blandon et al. (2010) however found that increased MS was associated with decreased emotional reactivity when examining children aged 24-84 months. Finally, Van den Akker, Dekovic, Prinzie and Asscher’s (2010) study of children aged 30-42 months found increased temperament “typicalness” was associated with increased positive parenting and decreased negative parenting, independent of initial temperament. The parallel changes between MS and temperament therefore reflect the reflexive interaction between maternal behaviours and temperament.

**Strengths and Limitations of Current Research**

**Adjustment for confounders.** A major limitation of earlier studies is that few adjusted for confounders (variables that are associated with both MS and temperament). Without adjusting for these in the analysis it is not possible to determine whether an association between MS and temperament could be explained by a common underlying cause. A diagram illustrating the possible role of confounders is presented in figure 1.
During the literature review, a number of potential confounders were identified. These include gender (Else-Quest et al., 2006), socio-economic variables (e.g. Jansen, et al. 2009), maternal depression (e.g. Huot, Brennan, Stowe, Plotsky & Walker, 2004; Musser, Ablow & Measelle, 2012; Stanley, Murray & Stein, 2004) maternal anxiety (e.g. Grant, McMahon, Reilly and Austin, 2010) and marital conflict (e.g. Moore, 2010). Of the 12 reviewed studies only two considered maternal mental health (Pauli-Pott et al., 2004; Glogger & Pauli-Pott, 2008) and two adjusted for marital conflict (Belsky et al., 1991; Kivijarvi et al., 2005). Therefore, the findings may not fully explain the association between MS and temperament.

Sample. The studies are also limited by small sample sizes ranging from 49 dyads (Siefer et al. 1996) to 370 (Blandon et al. 2010), with a mean sample size of 128. Siepak (2008) suggests that the magnitude of the effect of MS on temperament is small to moderate and therefore larger sample sizes may be necessary to detect an effect. In addition, small sample sizes are less able to represent wider populations, limiting the generalizability of their findings.

Temperament measurement. The varying definitions of temperament are reflected in the range of temperament measurements used. These most commonly included the R-ITQ (Carey & McDevitt, 1978) and the IBQ (Rothbart, 1981), which have been shown to have
strong convergent validity, when infants were assessed by mothers and teachers, and internal consistency (Goldsmith, et al., 1991). Other studies used standardized temperament assessment batteries (e.g. Laboratory Temperament Assessment Battery, Goldsmith & Rothbart, 1990), while others devised their own laboratory assessments.

Across the 12 studies some used parent-report measures (Van den Akker et al., 2010, Blandon et al., 2010, Kivijarvi et al., 2005), others used laboratory assessments (Van den Boom, 1994, Glogger & Pauli-Pott, 2008, Fish et al., 1991) while others used both (Siepak, 2008, Pauli-Pott et al., 2004, Seifer et al., 1996, Belsky et al., 1991). Garstein, Bridgett and Low (2012) suggest that there is no “gold standard” in temperament assessment, but that temperament measurement should be theoretically grounded, and have satisfactory reliability and construct validity. Eleven of the studies used at least one standardized measure of temperament, which comply with Garstein, et al.’s (2012) suggested requirements. However, Fish et al. (1991) used only their own ratings of temperament, therefore questioning the validity of their findings. The range of differing methods of temperament assessment makes drawing comparisons between studies difficult.

In addition, while all studies included a prior measurement of temperament, only two studies (Kivijarvi et al., 2005; Blandon et al., 2010) used comparative temperament measures across the two time points. For example, Kivijarvi et al. (2005) used the R-ITQ (Carey & McDevitt, 1978) and the TTS (Fullard, McDevitt & Carey, 1984) which are both age specific versions of the Carey Temperament Scales. Changes in temperament scores across the time points for the other studies may therefore reflect differences in measurement as opposed to differences in the child’s temperament.

**Maternal sensitivity measurement.** While all 12 studies measured MS by coding observed interaction, there was no agreement on behaviours being coded or methods of coding. All 12 studies rated mothers contingent responses to her child’s needs. Other studies
look additionally at maternal positive and negative affect (Kivijarvi et al., 2005; Siepak, 2008), maternal warmth (Blandon et al., 2010; Spinrad et al., 2012), maternal hostility (Van den Akker et al., 2010) and maternal intrusiveness (Fish et al., 1991; Siepak, 2008). Given the different assessments of MS, it is difficult to draw conclusions about the commonalities between findings and the mechanisms underlying the association between MS and temperament. This may be particularly important given the research to suggest that maternal responsiveness and maternal warmth may be associated differently with temperament (Davidov & Grusec, 2006).

**Poor study quality and lack of significant findings.** It is of note that studies that found no significant prospective association between MS and child temperament (Siepak, 2008; Owens et al., 1998) were more limited in their study quality. Siepak’s (2008) research used one of the smallest sample sizes (70 dyads). In addition both Siepak (2008) and Owens et al.’s (1998) research did not use standardized measures of temperament. In contrast, the majority of studies where a significant prospective association between MS and temperament was found used standardized measures of temperament and larger sample sizes. Siepak (2008) and Owens et al.’s (1998) studies may therefore have been inadequate to find evidence for an association between MS and temperament.

**Conclusions**

Literature examining the association between MS to non-distress and child temperament has reported inconsistent findings. The majority of studies have demonstrated an association between MS and different dimensions of temperament across childhood. While studies during early infancy demonstrated associations with NE, sociability, intensity of response and self-soothing abilities, studies in toddlerhood showed associations with more active self-soothing techniques. This may reflect the increased independence of toddlerhood and the increasing necessity to self-soothe rather than to rely on caregivers. While findings at
these early stages of development may be expected because of the relative plasticity of temperament before 24 months (Kochanska, 2001) the studies also showed an association between MS and temperament in later stages of development. Theoretically the results appear to support the mutual regulation and goodness-of-fit models of the association, given that the interaction and mutual influence is more clearly shown by longitudinal multi-time point studies such as Blandon et al. (2010) and Van den Akker et al. (2008). However, it is also of note that some studies did not find an association between MS and temperament dimensions. This may be because studies were limited by small sample sizes, leaving them underpowered to detect an effect of MS on temperament, lack of adjustment for confounding variables and a range of measures of temperament and MS, many with limited evidence of reliability.

More longitudinal studies are required utilizing large population samples to increase generalisability. Research must also adjust for a range of confounders to demonstrate the influence of other factors, including gender, early temperament, SES, maternal mental health and marital conflict. Studies should also use measurements of temperament and MS that have been shown to be reliable. The research is limited in its coverage of temperament development from 12-24 months and therefore research should focus on this stage of development. This would help inform theories of the aetiology of temperament development and potentially inform intervention.

References


Appendices

Instruction to authors

Psychological Review
APA Journals Manuscript Submission Instructions for All Authors

Overview

The following instructions pertain to all journals published by APA and the Educational Publishing Foundation (EPF).

Please also visit the web page for the journal to which you plan to submit your article for submission addresses, journal-specific instructions, and exceptions.

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Double-space all copy. Other formatting instructions, as well as instructions on preparing tables, figures, references, metrics, and abstracts, appear in the Manual.

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Supplying Supplemental Materials

APA can now place supplementary materials online, available via the published article in the PsycARTICLES database. Please see Supplementing Your Article With Online Material for more details.

Abstract and Keywords

All manuscripts must include an abstract containing a maximum of 250 words typed on a separate page. After the abstract, please supply up to five keywords or brief phrases.

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