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Verbal and nonverbal parental mentalizing profiles: Distinct profiles of mind-mindedness and embodied parental mentalizing according to infant attachment and parental factors

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ABSTRACT

Developmental researchers have highlighted the role played by parental mentalizing in early attachment. However, the manner in which verbal (i.e., mind-mindedness) and nonverbal (i.e., parental embodied mentalizing) parental mentalizing relate with one another on an individual level, and subsequently, how they contribute to parent-infant attachment, remains largely unexplored. Using a person-centered approach, this study aimed to identify verbal and nonverbal mentalizing profiles and their associations with infant attachment, as well as with parental factors and interactional context (e.g., exploration, transitions). Based on longitudinal studies from three countries (Canada, United Kingdom, and Israel), this study included 412 mother-infant dyads. Mind-mindedness and parental embodied mentalizing were assessed through two distinct observational procedures during free-play interactions at 6–8 months. Infant attachment was evaluated using the Strange Situation Procedure at 15–16 months. Latent profile analyses identified four parental mentalizing profiles based on verbal and nonverbal indicators: very low consistent, low consistent, high consistent, and inconsistent. The three consistent profiles reflected low or high levels across both verbal and nonverbal indicators, whereas the inconsistent profile was marked by inconsistency: these parents produced more non-attuned comments than other profiles but still demonstrated good embodied mentalizing and made appropriate mind-related comments. Results showed that the high consistent profile was associated with greater infant attachment security than the very low consistent, low consistent, or inconsistent profiles. This study suggests distinct parental mentalizing profiles based on verbal and nonverbal indicators, and their differential relations with later child attachment.

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1. Introduction

Infant attachment security has been a central concept in developmental psychology for over 50 years (Ainsworth et al., 1978; Bowlby, 1982; Van Ijzendoorn & Bakermans-Kranenburg, 2008). According to both attachment and mentalizing theories, children develop their own relational patterns through repeated interactions with their parent, which can lead to secure or insecure attachment. Secure attachment occurs if the child feels safe and uses the parent as a base from which to explore and, if necessary, as a source of comfort during moments of distress (Ainsworth et al., 1978; Bowlby, 1982; Waters & Cummings, 2000). Insecure attachment may take on different forms and is characterized by the child's lack of trust in their parent, likely resulting from unresponsive or inconsistent parental behaviors in response toward the child's signals, thereby leading to relational mistrust (Cassidy & Shaver, 2016; Lyons-Ruth & Jacobvitz, 2008; Main & Solomon, 1990). Parents' capacity to perceive, understand, and accurately interpret children's mental states enables them to interact in a more attuned and contingent manner with the infant, which in turn fosters a greater sense of security in the attachment relationship (Fonagy et al., 1991; Luyten et al., 2017; Meins et al., 2001; Slade, 2005). These relationships are internalized and form representations of the degree of safety and trust the child feels with the parent (Bretherton & Munholland, 2008).

In the last 50 years, researchers have described the mechanisms involved in the emergence of secure parent-child relationships (Thompson et al., 2022). Specifically, parental mentalizing has been identified as an important feature of child-parent attachment security (Koren-Karie et al., 2002; Meins et al., 2012; Slade et al., 2005; Zeegers et al., 2017). Parental mentalizing refers to parents' capacity to make sense of and accurately interpret their children's mental states (i.e., cognition, emotions; Meins, 1999; Slade, 2005; Koren-Karie et al., 2002). The role played by parental mentalizing in child attachment has been supported by several empirical studies and a meta-analysis (see reviews: Camoirano, 2017; McMahon & Bernier, 2017; meta-analysis: Zeegers et al., 2017). These studies have shown that more effective parental mentalizing is associated with secure attachment. Parents who integrate their child's emotions and mental states into their understanding of his or her behaviors and signals are able to respond more appropriately and foster the development of secure attachment.

1.1. Fostering child attachment security through parental mentalizing: what mechanisms are involved?

Although parental mentalizing capacity is seen as an important mechanism that contributes to the emerging attachment relationship, most of the research thus far has focused on verbal and explicit processes involved in parental mentalizing, namely, mind-mindedness (Meins et al., 2001), parental reflective functioning (Slade et al., 2005), or parental insightfulness (Koren-Karie et al., 2002). Despite their conceptual differences, these approaches and measures share the premise that parental mentalizing is an explicit, verbally expressed capacity, which is reflected in the way parents express themselves when talking about their child's mental states (Meins et al., 2001; Shai & Belsky, 2011a; Shai & Belsky, 2011b; Slade et al., 2005; Zeegers et al., 2017). However, parental mentalizing also comprises nonverbal and implicit aspects, which involve automatic processes captured by body movements (Shai & Belsky, 2011a; Shai & Belsky, 2011b). This nonverbal aspect of parental mentalizing refers to parents' ability to adapt their own kinesthetic/movement patterns to the child's mental states (Shai & Belsky, 2011a; Shai & Belsky, 2011b; Shai et al., 2017; Shai et al., 2022). Therefore, to fully capture the parent's ability to give meaning to the infant's internal world, there is value in assessing both the verbal (i.e., coherence, appropriate nature of mentalizing comments) and nonverbal (i.e., qualities of movements) facets of parental mentalizing.

In line with this idea, recent research has studied parental mentalizing by considering its multidimensional nature, focusing on both verbal and nonverbal facets (see Ierardi et al., 2022; Gagné et al., 2021; Gagné et al., 2023; Shai et al., 2017; Shai et al., 2022; Shai & Meins, 2018). These studies typically assess verbal parental mentalizing based on the construct of mind-mindedness, which refers to the parent's ability to make explicit mind-related comments about the infant's mental state, capturing the parent's mentalizing verbalizations during interactions (Meins & Fernyhough, 2015). Mind-mindedness includes two indicators: appropriate mind-related comments (AMRC) and non-attuned mind-related comments (NAMRC). Mind-related comments are considered appropriate when they seem consistent with what the infant may be experiencing. For example, if a child expresses frustration by struggling with a toy, a parent might say, "It seems like you're a little upset because the toy isn't working right now. Let's try again together." This response reflects an awareness of the child's emotional state. Conversely, a non-attuned mind-related comment occurs when the parent attributes an internal state to the infant that appears at odds with the infant's ongoing behavior. For instance, a parent might remove a toy from a child who is deeply engaged in play and then say, "You're fine, don't cry, you just want attention", thereby seemingly misinterpreting and failing to acknowledge the child's mental state. These two indicators are considered – appropriate and non-attuned comments – as two orthogonal dimensions of mind-mindedness (Meins et al., 2012).

With regard to nonverbal parental mentalizing, only one construct, parental embodied mentalizing (PEM), aims to capture the parent's nonverbal and implicit representation of the infant's mind (Shai & Belsky, 2011a; Shai & Belsky, 2011b; Shai et al., 2022). Based on the postulate that mental states (e.g., emotions, cognitions, desires) are also expressed through movement qualities such as the velocity, distance, shape, and rhythm and unfold between parent and infant interactive processes, PEM is determined by the extent to which the parent is appropriately responsive to the infant's mental state as expressed nonverbally (Shai et al., 2022). The PEM framework draws inspiration from Stern's (1985) work on affect attunement, which highlights how parents attempt to match their infant's emotional signals –

often conveyed crossmodally through variations in movement quality and rhythm. The degree and quality of this attunement process contribute to shaping the infant's sense of being understood, fostering trust in the parent, and strengthening the emotional connection and mutual understanding between them (Shai & Belsky, 2011a; Shai & Belsky, 2011b; Stern, 2010).

Accordingly, the focus in PEM is on *how* the movements occur (e.g., velocity, shape) rather than on the behaviors per se, as well as on the parent's ability to repair any interactive mismatch on a nonverbal level (Shai & Belsky, 2011a; Shai & Belsky, 2011b). For example, if a child cries, the parent may decide to hold the child (behavior). In this context, the parent's embodied mentalizing will focus on the *way* the parent picked up the child (i.e., quality of the movement), rather than on the parent's behavior. Did the parent pick up the child abruptly or gradually? Was the parent's tempo slow or very fast? Slower, more gradual movements generally reflect a parent with high PEM, compared to parents with more abrupt, faster movements. The PEM approach therefore draws attention to tempo (fast versus slow), directionality (shrinking versus growing), space (near versus far), tension flow (bound versus free), pacing (abrupt versus gradual), and pathways (linear versus rounded) in the dyadic exchanges between parent and child (Shai & Belsky, 2017).

The interest in studying the parent's mentalizing by considering its multidimensional nature is based on the idea that verbal and nonverbal behaviors index different aspects of parents' mentalizing and may therefore make distinct contributions to understanding the developing parent-child relationship. Current knowledge tends to support this hypothesis: of the four published studies that investigated links between verbal and nonverbal measures of parental mentalizing (Gagné et al., 2021; Ierardi et al., 2022; Shai & Meins, 2018; Shai et al., 2017), three have reported that these two dimensions are positively and moderately related (Gagné et al., 2021; Shai & Meins, 2018; Shai et al., 2017). Two of these studies also investigated the distinct roles played by verbal and nonverbal parental mentalizing in predicting infant attachment security (Gagné et al., 2021; Shai & Meins, 2018), reporting somewhat different findings. Shai and Meins (2018) reported that both PEM and mind-mindedness at 8 months predicted secure infant attachment at 15 months, while Gagné et al. (2021) observed that only PEM at 8 months was related to infant attachment at 15 months. These findings highlight that how these two dimensions of parental mentalizing interact with one another at the individual level and, subsequently, how they relate to child attachment remains largely unknown. This resonates with Law et al. (2021) qualitative study, which emphasizes that further study and measurement should "capture the breadth and depth of the multiple dimensions" of parental mentalizing (p.195). In line with this perspective, examining the ways in which verbal and nonverbal dimensions align or diverge at the individual level may foster a more comprehensive and integrative understanding of parental mentalizing processes. Studying parental mentalizing profiles across both dimensions therefore addresses a theoretical gap and offers an initial conceptualization grounded in empirical evidence, representing the novelty of this paper.

1.2. Profiles of verbal and nonverbal parental mentalizing

It can be hypothesized that distinct parental mentalizing profiles exist, characterized by different manifestations of verbal and nonverbal dimensions. For instance, some parents may predominantly express their mentalizing through mind-related verbal comments (i.e., mind-mindedness) during interactions with their child, whereas others may be less verbally expressive but nonetheless engage abundantly in nonverbal, embodied forms of mentalizing. Furthermore, some parents may have low levels of both verbal and nonverbal mentalizing, while others demonstrate high levels across both dimensions. These suggest that parents may display specific patterns of mentalizing based on individual differences in verbal and embodied mentalizing.

To identify such parental mentalizing profiles, the person-centered approach – in contrast to the variable-centered approach – represents the most informative method. This approach does not assume that a single model fits the entire population, but rather suggests that multiple relatively homogeneous subgroups can be identified in a population (Howard & Hoffman, 2018; Spurk et al., 2020; van der Gaag, 2023). This advanced clustering approach, which is gaining popularity and recognition in the humanities and social sciences (i.e., psychology), helps fill current gaps in our understanding of intra-individual processes (van der Gaag, 2023). Adopting a person-centered approach may therefore deepen our understanding of the links between different dimensions of parental mentalizing and child-caregiver attachment.

Moreover, studying parental mentalizing profiles may be valuable in clinical practice by offering a more nuanced understanding that can inform intervention strategies. Specifically, identifying such profiles, based on parents' strengths and weaknesses across verbal and embodied dimensions, may help clinicians gain deeper insight into parental mentalizing processes and the parent-infant relationship, thereby allowing for more tailored and responsive interventions. Furthermore, because these profiles may be identified as early as infancy, they hold promise for guiding targeted early interventions and timely referrals, ultimately supporting parents in developing more attuned and caregiving responsiveness.

To date, no study has focused on examining profiles of parental mentalizing based on both verbal and nonverbal assessments. To our knowledge, two studies have explored profiles of parental mentalizing by examining indicators derived from the self-report Parental Reflective Functioning Questionnaire (Lindblom et al., 2022; Madsen et al., 2025). Using a person-centered approach, Lindblom et al. (2022) identified three parental mentalizing profiles (i.e., High, Low, and Very Low parental reflective functioning), which supports the hypothesis that parents may have specific patterns of mentalizing. Similar findings were reported by Madsen et al. (2025), who identified three parental reflective functioning profiles in both mothers and fathers: Moderately Low Certainty profile (i.e., lower confidence in understanding infant mental states), a Moderately High Certainty profile (i.e., overconfidence in understanding infant mental states), and High Pre-Mentalizing tendencies (i.e., reflecting impairments in mentalizing). These findings underscore meaningful individual differences in parental mentalizing capacities and highlight the value of a person-centered approach for capturing such variability across caregivers. The current study aims to extend this work by focusing on verbal and nonverbal aspects of parental mentalizing.

1.3. Predictors and correlates of parental mentalizing profiles: the role of interactional context and personal factors

According to mentalization theory, mentalizing is a multifaceted, dynamic, and flexible capacity that is influenced by the relational context in which it unfolds (Luyten et al., 2017; Luyten et al., 2020). This means that beyond identifying parental mentalizing profiles and their associations with child attachment, it is essential to consider the interactional context in which the parental mentalizing profiles are examined. Although previous research has underscored the importance of interactional factors in shaping the quality of parent-child interactions (Madigan et al., 2006; Sjolseth et al., 2024), few studies have directly examined how the interactional context may be associated with parental mentalizing. Some emerging evidence suggests that parental mentalizing may be enhanced in structured settings compared to unstructured contexts, pointing to the potential scaffolding role of the environment (Gagné et al., 2023). Similarly, Væver et al. (2020) explored the interactional context – defined as the key communicative themes between parent and child, which can be considered as a form of conversation (Shai, 2017) – and its relationship with parental interactive behaviors. Their study revealed that exploration was associated with more attuned behaviors, such as appropriate affect, sustained presence, and mirroring (Væver et al., 2020). Additionally, they found that mothers who were less emotionally available, such as those exhibiting depressive symptoms, were more likely to engage in "instrumental" behaviors, such as transitions. These initial findings support the notion that considering the interactional context when scrutinizing parental mentalizing profiles could provide deeper insights into the multifaceted nature of parental mentalizing.

In addition to the interactional context, individual differences in caregiver characteristics have also been associated with variations in parental mentalizing (see meta-analyses: Aldrich et al., 2021; Wendelboe et al., 2024; Zeegers et al., 2017). For instance, younger mothers have been found to display lower levels of mind-mindedness (Demers et al., 2010; Larkin et al., 2019), parental reflective functioning (Riva Crugnola et al., 2018), and PEM (Gagné et al., 2023; Shai & Belsky, 2017) compared to their older counterparts. Similarly, lower mind-mindedness, parental reflective functioning and PEM have been associated with demographic risk factors, such as lower educational attainment (Gagné et al., 2023; Sleed et al., 2020; Smaling et al., 2015), low social support (Smaling et al., 2015), and low socioeconomic status (Arkle et al., 2023; Gagné et al., 2023; Shai & Belsky, 2017). In contrast, child-specific factors, such as sex, have been less consistently examined in studies of parental mentalizing (Trepiak et al., 2025). For example, a recent meta-analysis was unable to test moderation by child sex due to insufficient data (Trepiak et al., 2025). Nonetheless, some studies have identified child sex as a potential moderator in the relationship between parenting and developmental outcomes (Shakeel et al., 2021; Zimmer-Gembeck et al., 2013). Taken together, these findings suggest that individual characteristics, such as socioeconomic status, maternal age, and infant sex, may therefore help explain variations in parents' membership to a given parental mentalizing profile.

1.4. The present study

Using a person-centered approach, the overarching objective of this study was to explore the construct of parental mentalizing with greater depth and nuance by identifying distinct profiles based on verbal (mind-mindedness) and nonverbal (PEM) indicators. To further illuminate individual differences in attachment security, this study investigated whether parental mentalizing profiles were related to infant attachment. Additionally, this study sought to examine how personal factors (i.e., mother's age, infant sex, SES), and parent-child interactional context (e.g., exploration involving toys, physical themes such as body stimulation or manipulation, and instrumental interactions such as transitions) were related to these parental mentalizing profiles. Given the exploratory nature of this study, no specific hypothesis was formulated regarding the number of profiles. However, drawing on recent scientific advances, it is reasonable to expect both low and high parental mentalizing profiles, which may differentially relate to child attachment (see Lindblom et al., 2022; Madsen et al., 2025; Zeegers et al., 2017).

To achieve the overarching aim, this study used three datasets from Canada, United Kingdom, and Israel, which provided a suitable sample size to perform latent profile analysis (for more details, see Section 2.4 sample size requirement). As the study included samples from three countries, sample membership (i.e., sample by country) was taken into account to control for potential cultural effects.

2. Method

2.1. Study design and participants

This study combines three samples of mother-infant dyads ($N = 412$) based on longitudinal studies from Canada, the United Kingdom, and Israel. The sample included 107 Canadian dyads ($M_{age} = 21.66$ months, $SD = 1.88$, range= 15–25), 205 British dyads ($M_{age} = 28.90$, $SD = 5.55$, range=16–41), and 100 Israeli dyads ($M_{age} = 30.82$, $SD = 3.62$, range=23–42). Proportion of boys and girls was approximately equal: 46.6 %, 52.68 %, and 47 % of girls in the Canadian, British, and Israeli samples respectively. One difference between these three samples is that the Canadian sample included only mother-infant dyads considered to have low SES, based on the mothers' young age (less than 25 years old), low education level (less than 14 years of education), and low average family income. In the British and Israeli samples, more than half had high SES, representing 56.31 % (British) and 65.65 % (Israeli) of the sample.

Each sample was drawn from urban and rural areas (Québec City, Tees Valley, Tel-Aviv) where mothers were recruited through large hospitals or local health care professionals during the third trimester of pregnancy (Canada and Israel) or 8 months after birth (United Kingdom). The three studies were conducted in accordance with APA ethical standards in the treatment of human participants and the highest ethical standards were respected.

This study includes three measurement times. First, sociodemographic data were collected either during the third month of pregnancy (Canada and Israel) or 8 months after birth (United Kingdom) using an in-house questionnaire developed by the research

team (Canada and Israel) or with the Hollingshead Index (Hollingshead, 1975; United Kingdom). Second, verbal (i.e., mind-mindedness) and nonverbal (i.e., PEM) parental mentalizing data assessed from a parent-infant free play sequence were collected at 6 months (Israel) or 8 months (Canada, and United Kingdom). The free-play session, during which mothers were instructed to play with their baby as they normally would at home, lasted 8 min in Canada and 15–20 min in the United Kingdom and Israel. Hence, to minimize the potential impact of these variations, study samples (i.e., sample membership) was included as a predictor in the analyses, and the mean duration of the interactional context was also considered. Finally, infant attachment was evaluated at 15 months using the Strange Situation Procedure (SSP) in laboratory settings in two of the three samples (Canada and United Kingdom), as this procedure was not conducted in the Israeli sample.

2.2. Measures

2.2.1. Verbal Parental Mentalizing: Mind-Mindedness

Maternal mind-mindedness was evaluated from videotaped free-play parent-infant interaction following the coding system developed by Meins and Fernyhough (2015) when infants were 6 or 8 months of age. Mothers' verbalizations during the free-play interaction were transcribed verbatim, analyzed, and classified according to the two mind-mindedness indicators. Appropriate mind-related comments (AMRC) index the caregiver's accurate attribution of internal states to the infant (e.g., saying the infant is interested in the toy radio while they are actively engaged in playing with it), whereas non-attuned mind-related comments (NAMRC) indicate misinterpretations of infant mental states (e.g., saying the infant is bored with the toy radio while they are actively engaged in playing with it).

In each dataset, a coder blinded to all other measures and unaware of research hypotheses coded the mind-mindedness data. The coding was conducted by graduate students, including master's and Ph.D. candidates, specializing in child developmental psychology. Please note that the mind-mindedness measure does not require formal certification. However, to ensure accurate application of the procedure, coders were trained using the coding manual and practiced coding approximately fifteen families to ensure their qualifications and competence in implementing the measure. Frequency scores for AMRC, NAMRC, and verbalizations unrelated to mind-mindedness (i.e., verbosity) were calculated. For each sample, interrater agreement was based on a random sample representing approximately 20–25 % of mother-infant interactions. Interrater agreement for dichotomously coding mind-related comments as AMRC and NAMRC coding varied between κ = 0.70–0.81, indicating good reliability. Disagreements were settled through discussion.

2.2.2. Nonverbal Parental Mentalizing: Parental Embodied Mentalizing

The same mother-infant interactions were coded for PEM following the procedure developed by Shai (PEM Coding System Manual; Shai, 2017). This observational strategy focuses on dynamic communicative body movements and was therefore coded with the sound turned off. To assess PEM, the Embodied Circles of Communication (ECC), consisting of kinesthetic-manifested and nonverbal communicative exchanges between parent and infant, were first identified. Secondly, predominant kinesthetic qualities – referring to directionality (shrinking vs. growing), pacing (abrupt vs. gradual), pathways (linear vs. rounded), tension flow (bound vs. free), tempo (fast vs. slow), and space (near vs. far) – were identified in each ECC. Based on the kinesthetic qualities, a global PEM score was assigned using a 7-point scale (from 1 = very low to 7 = very high).

In each sample, PEM was coded by a certified coder who had been officially qualified to administer the measure. A second coder, blind to all other observational measures and unaware of research hypotheses, coded a random sample of approximately 20 % of the total sample for reliability. The coding was carried out by Ph.D. students with expertise in child developmental psychology. Intraclass correlations for the PEM score ranged between .83 and .90 across the three samples, reflecting strong interrater agreement. Disagreements were resolved by consensus among the coders.

2.2.3. Interactional Contexts

Interactional contexts were identified using the observational procedure developed by Shai (2017). These interactional contexts represent communicative exchanges that occur between parent and infant and involve a contingent exchange between them. Shai (2017) proposed seven interactional contexts: exploration, transition, holding, manipulation, investigation, stimulation, or connectivity. Exploration typically involves toys, while other themes, such as transition, holding, manipulation, investigation, or stimulation, refer to physical manipulation by the parent. Transitions often serve a functional purpose in parent-child interactions, such as when the parent moves the child's body through the space to initiate a new activity. Investigation, stimulation, or manipulation usually involves physical interactions, such as a parent tickling or kissing the baby. Holding refers to parents' ability to use their own body as a supportive environment for the child. Lastly, in connectivity, the interaction purpose is to connect and create intimacy between parent and child, as in the peek-a-boo game.

Each time a parent or infant engaged in one of these interactional contexts in the free-play interaction, the interactional context was coded as an occurrence. A frequency score was calculated based on the number of times each context appeared in parent-child interactions during free play, using a random sample of approximately 20 % of the total sample. The mean duration of the interactional contexts was also calculated. Intraclass correlations for both interactional and duration scores ranged between .88 and .98 across the three samples, indicating excellent reliability. Disagreements were resolved by consensus among the coders.

2.2.4. Infant Attachment

Infant-mother attachment was evaluated using the Strange Situation Procedure (SSP, Ainsworth et al., 1978) at 15–16 months. This procedure, which includes separation and reunion between parent and infant, classifies infants into four attachment categories: secure,

avoidant, ambivalent-resistant (Ainsworth et al., 1978), and disoriented-disorganized (Main & Solomon, 1990). This procedure allows for classifying the child's attachment as secure-insecure and organized-disorganized, which were used in this study. All Strange Situation sessions were coded by a trained and reliable researcher with expertise in child developmental psychology who was blind to all other measures and unaware of the research hypotheses. An independent second coder with similar expertise, also blinded to all other measures, conducted a separate coding to ensure reliability. Interrater agreement using the four-way (secure, avoidant, resistant, and disorganized), examined on approximately 25–30 % of the samples, ranged between κ = 0.75–0.82, indicating excellent interrater agreement. Discrepancies were resolved through consensus among the coders.

2.3. Analytic strategy

According to the theoretical conceptualization of the two parental mentalizing constructs included in this study (i.e., mind-mindedness and PEM), the profiles were based on three distinct indicators: (1) appropriate mind-related comments (AMRC), (2) non-attuned mind-related comments (NAMRC), and (3) PEM. Since the frequency scores for AMRC and NAMRC were used in the latent profiles analysis, overall verbosity was also considered as an indicator, in accordance with Meins and Fernyhough's procedure (2015). Latent profile analyses (LPA) for continuous variables were conducted via Mplus version 8.1 software using the robust maximum likelihood (MLR) estimation, which corrects standard errors for data non-normality (Muthén & Muthén, 2018). Following the recommendations of Masyn (2013), two different parametrizations of the means and variance-covariance matrix were tested: (1) a conditional independence with equal variances across profiles model (i.e., Mplus defaults) and (2) a conditional independence with unequal variances across profiles model. For each parametrization, the LPA models were tested iteratively starting with one-profile solution and increasing up to six profiles.

To identify the number of parental mentalizing profiles based on verbal and nonverbal mentalizing indicators, the retained model was chosen based on the fit statistics and theoretical relevance for each class (Lanza & Cooper, 2016; Lezhnina & Kismihók, 2022; Spurk et al., 2020). The best fitting model, referring to the optimal number of profiles, was based on two likelihood adjusted tests, namely the Bootstrap Likelihood Ratio Test (BLRT) and the Lo-Mendell-Rubin Adjusted LRT Test (VLMR). Significant results from the BLRT and VLMR tests suggest that the model with more classes provides a better fit to the data, supporting the inclusion of an additional class. Conversely, a non-significant BLRT or VLMR indicates that adding another class does not substantially enhance the model, and therefore, a simpler model should be selected (Nylund-Gibson & Choi, 2018). Moreover, information criteria were taken into account when selecting the final model. Four information criteria were considered, namely the Bayesian information criterion (BIC), Sample-size adjusted BIC (ABIC), Akaike's information criterion (AIC), and Consistent AIC (CIAC). Lower values in all information criteria suggest a better fitting model. An elbow graph displaying these values for each model can also aid the interpretation by visually identifying the point where adding more classes no longer significantly improves the model fit (Masyn, 2013). Minimum cluster size was also considered, following Lindblom et al. (2014) recommendations, who suggested retaining clusters larger than 4 % of the sample. Moreover, although entropy should not be used to select the best fit model, it was used to compare the classification accuracy of alternative models. An entropy of .80 or larger is considered adequate (Nylund-Gibson & Choi, 2018).

Once the best fit latent profile solution was identified, predictors (i.e., mother's age, infant sex, SES, and sample membership) were directly incorporated into the final model to predict class membership through a multinomial logistic regression (Morin & Litalien, 2019). Subsequently, the Bolck-Croon-Hagenaars (BCH) method (Bakk & Vermunt, 2016; Morin & Litalien, 2019) was used to examine differences between latent profiles in infant attachment and interactional factors. This statistical method was chosen as it accounts for various sources of error, including data non-normality and measurement dependencies, while preventing shifts in profiles from the unconditional model (Asparouhov & Muthén, 2021; Bakk & Vermunt, 2016; Morin & Litalien, 2019). Thus, the BCH method provides the most unbiased estimates of class-specific distal outcome means (Shin et al., 2019).

2.4. Sample size requirement

The required sample size for LPA is a complex issue as the answer varies based on several factors, including the number of class indicators, the reliability and variance of the class indicators, the number of latent classes, the distinctness (or separation) of the classes, the relative sizes of the classes (e.g., the size of the smallest expected class), among other properties. Currently, no definitive guidelines exist for sample size in LPA and other mixture models (Nylund-Gibson & Choi, 2018). While some simulation studies have recommended a minimum of 500 participants (Finch & Bronk, 2011; Nylund et al., 2007), this recommendation should be applied cautiously due to mixed findings and model variability. More recent methodological research suggests that a sample size of around 300 provides sufficient power for most fit indices and statistical tests in mixture modeling (Nylund-Gibson & Choi, 2018). Alternatively, Monte Carlo simulations can be used to determine the necessary sample size for a specific study, but this requires specifying "true" model parameters (Muthén & Muthén, 2002), which is not feasible given the exploratory nature of the present study. Overall, based on current evidence, our total sample size can be considered adequate for using LPA.

3. Results

3.1. Identification of the best latent profile model

Table 1 presents the statistical indices for the one-profile to six-profile models across the two parameterizations. An elbow graph of the information criteria is presented in supplementary material. Upon reviewing the statistical indices, AIC, CAIC, BIC and SABIC were

consistently lower for the conditional independence models with unequal variances compared to those with equal variances, when the same number of profiles was considered. Therefore, the model with conditional independence and unequal variances across profiles were further evaluated as the optimal parameterization.

As the AIC, CAIC, BIC and SABIC continuously decreased between the one- and six-profile solutions (lower values indicating a better fit) and the LRT bootstrap remained significant, the Lo-Mendell-Rubin Adjusted LRT Test (VLMR) and cluster size were examined in each model. Based on the elbow graph of unequal variances (see supplementary material), the CAIC suggested that the optimal solution consisted of four profiles. The conceptual value of the 5-profile or 6-profile model was also considered, but the fifth or sixth class did not provide any additional insights above the 4-class model. Based on conceptual considerations, the non-significant VLMR, and the cluster sample size, the five- and six-profile solutions were excluded. Given all these considerations, a four-profile model with unequal variances was retained as the most interpretable and parsimonious model. Entropy of this model was greater than .80 and the estimated posterior probabilities of the final 4-profile solution indicated a high degree of precision in classifying parents in each of the four profiles (see supplementary material).

Fig. 1 displays the four parental mentalizing profiles: *very low* consistent, *low* consistent, *high* consistent, and *inconsistent*. Consistent profiles reflected stable patterns of either low or high levels across both verbal and nonverbal dimensions of parental mentalizing. In contrast, the inconsistent profile was characterized by a mismatch between verbal and nonverbal indicators. Following the LPA procedure, the mean scores of each indicator (i.e., AMRC, NAMRC, and PEM) were standardized for ease of interpretation. Therefore, all scores close to 0 correspond to the average of the total sample, while higher scores for AMRC or PEM correspond to more appropriate comments and greater PEM. Conversely, lower scores on NAMRC suggest that the mother made few non-attuned comments regarding her infant's mental states.

The *very low* consistent profile described 20.60 % of the parents ($n = 90$). Parents in this profile showed lower scores on AMRC and NAMRC compared to other profiles. They also scored lower on PEM in comparison to the high consistent or inconsistent profiles. The *low* profile, which included 35.80 % parents ($n = 149$), were lower on AMRC and PEM compared to the *high* consistent or *inconsistent* profiles. Additionally, parents in the low profile made more non-attuned mind-related comments compared to those in the *very low* or *high* profiles. Parents in the *high consistent* profile were characterized by more appropriate mind-related comments, higher PEM, and low non-attuned mind-related comments which described 30.90 % of the sample ($n = 131$). Finally, 12.70 % of the parents were classified in the *inconsistent* profile ($n = 42$). These parents made more non-attuned comments compared to other profiles, but still demonstrated good PEM and made appropriate mind-related comments. Table 2 presents the descriptive statistics for study variables among each latent profile. The correlation table between PEM, mind-mindedness, and the interactional factors is provided in the supplementary material. For further information regarding the descriptive statistics related to each sample, please refer to the following articles (Afek et al., 2022; Gagné et al., 2021; Shai & Meins, 2018).

3.2. Predictors of Profile Membership

The results of the multinomial logistic regression predicting parental mentalizing profile membership are presented in Table 3. In this analysis, the *low* consistent profile is used as the reference group. Parental SES significantly predicted membership in the *high* consistent profile and marginally predicted membership in the *inconsistent* profile. These findings suggest that parents with higher SES are more likely to belong to either the *high* consistent or *inconsistent* profiles compared to the *low* consistent profile. Additionally, sample membership (i.e., country-specific sample) emerged as a significant predictor of profile membership across all groups. This result suggests that even though all the latent classes can be recognized in all samples, mothers in the different samples do not have the same likelihood of belonging in all classes. The main difference is that mothers from the Canadian and Israeli samples have a significantly smaller probability of belonging to the *high* consistent profile, compared to parents from the British sample. This finding

Table 1

Model Fit Indices for Verbal and Nonverbal Parental Mentalizing Latent Profile Analyses.

Model	#fp	Number per profile	Log-Likelihood	AIC	CAIC	BIC	SABIC	Entropy	Bootstrap LRT	VLMR
Conditional Independence with Equal Variances										
1	8	412	−2327.06	4670	4710	4702	4676	–	–	–
2	13	262/150	−2095.77	4217	4282	4269	4228	0.89	0.00	0.00
3	18	260/131/21	−2020.70	4077	4167	4149	4092	0.92	0.00	0.09
4	23	109/250/31/22	−1979.99	4005	4121	4098	4025	0.90	0.00	0.13
5	28	34/227/25/4/122	−1951.40	3958	4099	4071	3982	0.92	0.00	0.05
6	33	32/221/4/102/27/26	−1907.44	3880	4046	4013	3908	0.91	0.00	0.04
Conditional Independence with Unequal Variances										
1	8	412	−2327.06	4670	4710	4702	4676	–	–	–
2	17	227/185	−1977.17	3988	4073	4056	4002	0.86	0.00	0.00
3	26	92/148/172	−1871.86	3795	3926	3900	3817	0.88	0.00	0.00
4	**35**	**149/131/90/42**	**−1811.76**	**3693**	**3869**	**3834**	**3723**	**0.83**	**0.00**	**0.01**
5	44	93/111/58/38/112	−1777.18	3642	3863	3819	3679	0.79	0.00	0.44
6	53	87/57/63/61/32/112	−1749.05	3604	3870	3817	3649	0.77	0.00	0.67

Notes. #fp = Number of free parameters. AIC = Akaike Information Criterion. CAIC = Constant AIC. BIC= Bayesian Information Criterion. SABIC = Sample-Adjusted BIC. LRT Bootstrap = *p*-value of parametric bootstrapped likelihood ratio test for k-1 vs. k profiles. VLMR=Lo-Mendell-Rubin Adjusted LRT Test.
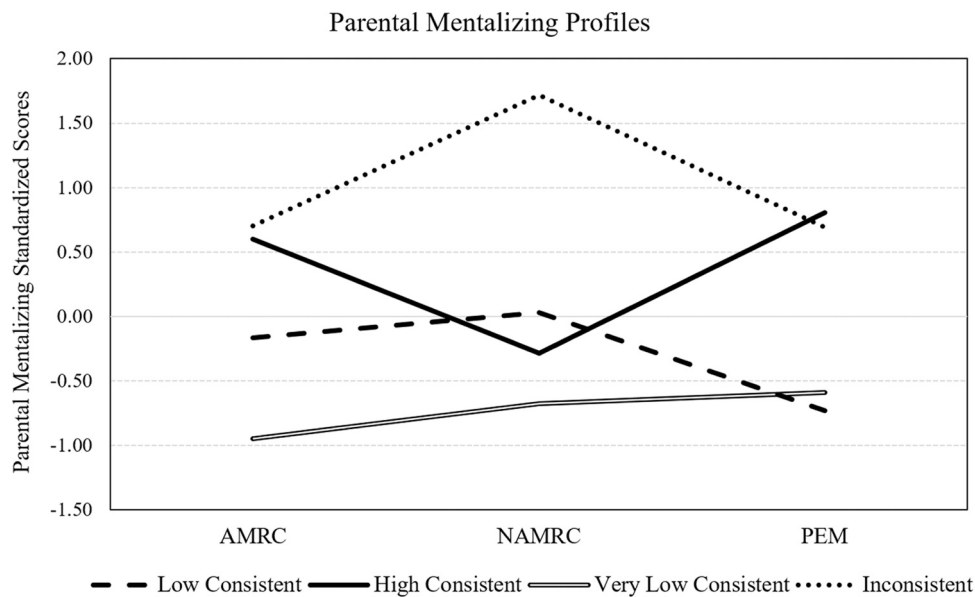
Fig. 1. Parental Mentalizing Profiles Based on Verbal and Nonverbal Indicators. *Notes.* AMRC=Attuned mind-related comments; NAMRC=Non-attuned mind-related comments; PEM=Parental embodied mentalizing.

Table 2
Descriptive Statistics Among Parental Mentalizing Profiles.

	Very low consistent (n = 90)	Low consistent (n = 149)	High consistent (n = 131)	Inconsistent (n = 42)
	Means (SD)	Means (SD)	Means (SD)	Means (SD)
Characteristics				
Mother's age	29.28 (4.83)	25.11 (5.03)	29.03 (5.62)	27.44 (5.52)
Infant sex	49 (boys) | 40 (girls)	73 (boys) | 73 (girls)	58 (boys) | 73 (girls)	25 (boys) | 17 (girls)
SES (0 low – 1 high)	46 (low) | 39 (high)	115 (low) | 34 (high)	46 (low) | 85 (high)	21 (low) | 21 (high)
Profiles indicators				
AMRC	1.85 (1.44)	7.83 (0.50)	13.46 (8.41)	9.41 (7.84)
NAMRC	0.34 (0.47)	3.02 (0.24)	1.87 (1.70)	14.51 (5.11)
PEM	3.64 (0.60)	3.61 (0.05)	5.01 (0.92)	4.88 (0.69)
Interactional contexts				
Holding	2.75 (2.60)	3.46 (2.65)	4.45 (3.85)	5.20 (3.72)
Investigation	0.40 (0.76)	0.40 (0.80)	0.97 (1.48)	1.04 (1.76)
Manipulation	2.14 (2.49)	4.45 (3.97)	0.99 (1.35)	1.13 (1.42)
Stimulation	3.92 (3.69)	4.34 (3.38)	2.57 (2.34)	3.53 (3.46)
Transition	4.26 (4.30)	8.01 (5.17)	2.74 (3.53)	3.80 (3.86)
Exploration	16.56 (7.15)	15.33 (5.95)	21.44 (7.90)	21.75 (8.53)
Connectivity	0.22 (0.81)	0.55 (1.07)	0.00 (0.00)	0.00 (0.00)
Means duration	15.55 (7.24)	12.37 (5.68)	18.76 (8.36)	16.14 (7.34)
Infant attachment				
Insecure	28.00 %	32.40 %	14.60 %	60.00 %
Disorganized	28.00 %	32.40 %	6.30 %	30.00 %

Notes. AMRC=Attuned mind-related comments; NAMRC=Non-attuned mind-related comments; PEM=Parental embodied mentalizing.

should be interpreted with caution, as the Canadian sample is characterized by moderate psychosocial risk. Therefore, it would be premature to attribute these differences solely to cultural factors. Finally, neither mother's age nor infant sex were significant predictors of profile membership.

3.3. Differences between parental mentalizing profiles in infant attachment and interactional contexts

Table 4 shows the results of mean difference tests between parental mentalizing profiles in infant attachment and interactional contexts. It should be noted that among the seven interactional contexts, connectivity was not considered in analyses given that the average is close to zero for all profiles.

Infants in the *high* consistent profile were more likely to present secure and organized attachment than those in other profiles. Infants whose parents were in the *very low* or *low* consistent profiles tended to be more secure, albeit marginally significantly,

Table 3
Results of the Multinominal Logistic Regression of Profile Membership Predictors.

Predictors	Low consistent versus					
	Very low consistent		High consistent		Inconsistent	
	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)
Mother's age	−0.04	0.07	−0.07	0.09	−0.12	0.09
Infant sex	−0.16	0.39	0.27	0.27	−0.44	0.64
SES (0 low – 1 high)	−0.08	0.48	**2.05***	0.85	*1.59*[t]	0.87
Canada[a]	**−4.24****	0.94	**−17.99*****	0.71	**−6.98*****	1.11
Israel[a]	−1.01	0.69	**−17.85*****	0.67	**−15.25*****	0.74

Notes. a= Reference group United Kingdom; ***p < 0.001, **p < 0.01, *p < 0.05, [t]p < 0.08.

compared to those in the *inconsistent* profile. No significant differences were observed for organization. Additionally, no significant differences were found between the *low* and *very low* profiles regarding attachment security or organization.

Compared to the *very low* or *low* consistent profiles, mothers in the high consistent profile engaged in exploration more frequently, allowed their child to investigate more, used their body to support their child's exploration, and used less physical manipulation (i.e., stimulation, manipulation, and transition). Interactions between the parent and infant were longer for those in the *high* consistent profile than for those in the *very low* or *low* consistent profiles. Similarly, compared to mothers in the *very low* or *low* consistent profiles, mothers in the *inconsistent* profile were generally more involved in exploration and holding, and used more manipulation with their infant. Mothers in the *inconsistent* profile also used fewer transitions, and their interactions were longer than those in the *low* consistent profile. However, in contrast to mothers in the *high* consistent profile, mothers in the *inconsistent* profile engaged more instrumental or physical interactions (i.e., transition, manipulation, holding) and less in exploration.

4. Discussion

The purpose of this study was to take a more in-depth and nuanced look at the construct of parental mentalizing by identifying profiles based on both verbal (mind-mindedness) and nonverbal (PEM) indicators, and examining their association with infant attachment. Using a person-centered approach, this study revealed four distinct parental mentalizing profiles, some of which were differently associated with infant attachment security at 15 months. In addition, given the flexible nature of parents' mentalizing capacity, a second aim was to identify interactional aspects (e.g., exploration involving toys, physical themes, and instrumental interactions) and personal factors (i.e., mother's age, infant sex, SES) that distinguish profile membership.

Based on verbal and nonverbal indicators of parental mentalizing, the present findings suggest four profiles, namely *very low* consistent, *low* consistent, *high* consistent, and *inconsistent*. Unsurprisingly, the results revealed a low consistent and a high consistent profile, which is in line with Lindblom et al. (2022) study that focused solely on explicit/verbal parental mentalizing processes. The third profile identified – namely *inconsistent* – was characterized by a small proportion of parents who, while demonstrating similar rates of appropriate verbal and embodied mentalizing as high consistent mothers, made more non-attuned comments compared to mothers in the other profiles. The final profile identified was the *very low* profile, characterized by significantly lower scores on each mind-mindedness indicator and embodied mentalizing compared to other profiles. This profile seems to represent parents who engage very little in both verbal and nonverbal mentalizing processes while interacting with their child. By adopting a person-centered approach to explore patterns of parental mentalizing, this study highlighted individual differences in parents' mentalizing abilities, leading to a more precise and nuanced understanding of how both verbal and nonverbal mentalizing may manifest. To our knowledge, these findings represent the first empirical evidence supporting distinct patterns of parental mentalizing based on verbal and nonverbal

Table 4
Mean Differences Between Mentalizing Profiles in Infant Attachment and Interactional Contexts.

	Parental Mentalizing Profiles					
Infant attachment (0−1)	Low vs High	Very low vs High	Inconsistent vs High	Low vs Inconsistent	Low vs Very low	Very low vs Inconsistent
Insecure – secure	**27.25*****	**6.85****	**32.55*****	*3.59*[t]	0.16	*3.01*[t]
Desorganized – organized	**19.85*****	**4.41****	**5.08***	0.01	0.11	0.05
Interactional contexts						
Holding	**4.41***	**12.28****	**6.86****	**7.39****	**3.86***	**14.10*****
Investigation	**12.46*****	**10.77****	2.40	**4.76***	0.01	**4.49*****
Manipulation	**96.89*****	**9.84****	**59.48****	**69.15*****	**31.15****	**5.11*****
Stimulation	**26.26*****	**8.72****	0.41	1.60	0.82	0.21
Transition	**96.96*****	**4.98***	**10.91****	**31.40*****	**37.26****	0.03
Exploration	**44.59****	**17.87*****	**15.12****	**19.40*****	2.13	**10.07*****
Means duration	**50.85*****	**7.79****	0.04	**8.61****	**13.06****	0.026

Notes. Tests for categorical variables are chi-square(χ^2), while tests for continuous variables are Wald tests. ***p < 0.001, **p < 0.01, *p < 0.05, [t]p < 0.08.

measures. This study may thus help to provide initial insights into the complexity of parental mentalizing capacities and functioning.

Through the identification of different profiles, this study also highlighted different interactive and relational patterns that could in turn lead to individual differences in infant development, in this case, attachment. The results showed that infants whose parents were classified in the *high* consistent profile were more likely to be classified as securely attached and organized compared with those in *very low* consistent, *low* consistent or *inconsistent* profiles. Our findings are in line with previous research on parental mentalizing and attachment (Meins et al., 2012; Shai & Meins, 2018; Zeegers et al., 2017), as well as with the most recent study by Madsen et al. (2025), who identified similar patterns on verbal/explicit parental mentalizing profiles and infants' socio-emotional outcomes. Specifically, Madsen et al. (2025) found that parents in low mentalizing profiles at 4 months reported more socioemotional difficulties in their infants at 11 months. In our study, lower parental mentalizing profiles were associated with insecure attachment compared to the *high* consistent profile, highlighting the role of parental mentalizing in shaping the parent-child attachment bond, which in turn can influence infants' socio-emotional development (McMahon & Bernier, 2017; Zeegers et al., 2017).

Alongside this broader pattern, a trend was observed whereby infants whose parents were classified in the *very low* or *low* profiles were more likely to be securely attached than those whose parents belonged to the *inconsistent* profile. Although these results should be interpreted with caution due to their marginal nature, they seem to suggest the importance of a predictable environment. Indeed, parents in the *very low* or *low* consistent profiles showed lower levels of both verbal and nonverbal mentalizing, compared to parents in the *inconsistent* profile, who still demonstrated relatively good embodied mentalizing and occasionally made attuned mind-related comments. This suggests that, even though parents in the *very low* or *low* consistent profiles may have significant limitations in their mentalizing abilities, their stability to being low may contribute to a predictable pattern of parent-child interactions, and in a way, provide a certain sense of security. However, when compared to the infant in the *high* consistent profile, those in the *very low*, *low* consistent or *inconsistent* profile showed less secure and more disorganized attachment, which is in line with expectations. More broadly, our results suggest that although a high level of appropriate mind-related comments and PEM can positively influence attachment outcomes, they may not be sufficient to counterbalance the potential negative impact of significant misinterpretations of the child's mental states when predicting infant attachment.

The consideration of interactional factors provides more insight into characteristics that define these profiles in relation to the quality of parent-child attachment. By exploring the predominant interactional contexts of the dyadic exchanges between parent and child, it is possible to capture with more precision the singularity that characterizes parent-infant interaction patterns. Our findings revealed distinct parent-infant interaction patterns. First, mothers classified as *high* consistent were more involved in exploration, allowed space for their child to investigate, used their own body as a supportive environment for the infant's mental state (i.e., holding), and used less transactional (e.g., transition) or physical manipulation (e.g., stimulation) in comparison to mothers in the *very low* or *low* consistent profiles. Overall, mothers considered lower in verbal and nonverbal parental mentalizing engaged less in exploration and used more physical manipulation, such as stimulation (e.g., tickles or kisses), which may be considered intrusive from the infant's perspective and therefore not consistent with the infant's mental states.

These interaction patterns (e.g., *high* consistent vs. *low* or *very low* consistent) also provide insights into the quality of later attachment, suggesting that fostering opportunities for the child to explore while using fewer physical and instrumental manipulations may be associated with a more secure and organized attachment. Our findings are consistent with attachment theory and mentalizing frameworks, which stress that sensitive and responsive parenting – supporting both emotional connection and child exploration – is essential for the development of secure attachment (Ainsworth et al., 1978; Bowlby, 1982; Slade, 2005). These findings underscore the importance of the specific parent-child interactional context and parental mentalizing to fully understand variations in attachment.

Regarding the singularity that characterizes parent-infant interaction patterns, another pattern that appears to emerge from our results, and somewhat more intriguing than the first three (*very low* consistent, *low* consistent and *high* consistent), is the *inconsistent* profile. As mentioned above, this profile, which accounts for 12.70 % of our sample, demonstrated similar rates of appropriate verbal and embodied mentalizing as *high* consistent mothers but made more non-attuned comments compared to the other profiles. Upon closer examination, these parents seem to engage in more positive interactional contexts with their baby than those in the *very low* or *low* consistent profiles. More specifically, mothers classified in the *inconsistent* profile are more engaged in exploration, use their own body to support the child's mental state, and rely less on bodily manipulation and functional themes (i.e., transitions) than mothers in the *very low* or *low* consistent profiles. However, despite the positive interactions, there is a predominance of misreading the child's mental states, which tends to generate insecurity. One possible hypothesis is that these parents may experience higher levels of stress or anxiety leading to performance issues in their relationship with their baby. In other words, these parents may be more preoccupied with performing and being perceived as a "good parent", which can lead to misinterpretations of their child's mental states, and consequently more non-attuned mind-related comments.

Given that very few studies report non-attuned mind-related comments (McMahon & Bernier, 2017), it is difficult to establish direct links between these findings and those of previous research. However, existing research on parental stress and mind-mindedness suggests that parents experiencing high levels of stress or anxiety are more likely to make non-attuned comments (Larkin et al., 2021; Suttora et al., 2020), supporting the idea that parents classified in the *inconsistent* profiles observed in our study may be experiencing higher levels of stress. This hypothesis aligns with previous research on mentalizing impairments, which suggests that vulnerability to depression and anxiety is associated with fluctuations in reflective functioning (Berthelot et al., 2019; Luyten & Fonagy, 2018; Luyten et al., 2020). These impairments often manifest as either overly simplistic or excessively hyperactive and over-analytic interpretations of mental states (Fonagy & Luyten, 2009). Such a pattern may characterize the *inconsistent* profile, in which verbal mentalizing abilities fluctuate between accurate interpretation and misinterpretation of the child's mental states, potentially shaped by underlying emotional vulnerabilities.

A final noteworthy finding emerging from our results concerns the two low profiles. When comparing them, parents in the *very low*

profile used less instrumental interactions with their child than those in the *low* profile. Specifically, parents in the *low* profile were more likely to engage in transitions and physical manipulation, and showed higher verbal engagement in both indicators (attuned and non-attuned mind-related comments) compared to parents in the *very low* profile. Although both profiles were associated with greater attachment insecurity than the *high* profile, parents' difficulties in mentalizing seem to manifest through two distinct interactional patterns in their relationship with their child. Our results align with those of Lindblom et al. (2022), who identified two lower profiles (low and very low) using PRFQ scales at 6 months. These profiles were characterized by a *low* and *very low* level of interest and curiosity about the child's mental states. In our study, although we did not have direct access to a specific score measuring curiosity and interest in the child's mental states, the presence of *low* and *very low* scores on attuned mind-mindedness and embodied mentalizing may reflect a parent who is minimally engaged with her or his child or tends to remain withdrawn. This, in turn, could suggest a lack of interest and curiosity about the child's mental states.

In summary, this study provides initial empirical support for different patterns or profiles of parental mentalizing based on verbal and nonverbal aspects, and their differential relations with later parent–infant attachment. Additionally, by exploring interactional factors, this study allows for a more precise understanding of the singularity that characterizes parent-infant interaction patterns and how this predicts the security of parent-infant attachment. Beyond its theoretical contribution, identifying parental mentalizing profiles based on verbal and embodied indicators carries significant clinical implications. It supports a shift toward more personalized interventions that consider each parent's specific strengths and vulnerabilities within the interactional context. For instance, parents showing inconsistencies across modalities may benefit from support aimed at fostering coherence between verbal reflections and embodied mentalizing. In contrast, those with lower levels of verbal and nonverbal mentalizing may require foundational guidance in detecting and interpreting subtle infant cues, particularly nonverbal signals. By profiling parental mentalizing, interventions can be more precisely tailored to the unique needs of each dyad, ultimately enhancing the parent-child relationship and promoting positive child development outcomes.

4.1. Limitations and future directions

This study has some limitations that must be acknowledged. First, the sample included only mother-infant dyads. Studies focusing specifically on fathers and on the distinctions between mothers and fathers in terms of parental mentalizing profiles are therefore avenues to consider. Beyond examining differences between parents, it is also essential to investigate potential complementary or compensatory dynamics within the parental dyad. Future research could explore whether a parent with a highly consistent mentalizing profile is able to buffer or attenuate the adverse effects linked to a partner's very low consistent profile, particularly concerning child developmental outcomes.

In addition, although the inclusion of samples from three different countries can be considered a strength that increases sample size and informs on cross-cultural validity, combining the three samples is still not optimal. Indeed, sample membership was a predictor of profile membership in the multinomial logistic regression, which suggests that some of the latent classes identified in the current study are less likely to occur in some of the samples. The ideal analytic solution would have been to perform a multigroup LPA, but the relatively small samples (when considering each country's sample one by one) precluded the use of this strategy. A replication study with larger samples is thus needed. Future research should explore how cultural contexts shape parental mentalizing profiles and their associations with child development, as cross-sample variations observed in this study suggest potential cross-cultural effects.

Another limitation is that given the secondary nature of the data analysis, we were limited in the number of potential predictors of profile membership that could be considered. Further studies should thus include other parental factors (e.g., depression, trauma) that might explain membership in the parental mentalizing profiles. A final limitation to consider is that parental mentalizing was assessed exclusively in a low-stress free-play context, which may not have fully captured parents' verbal and embodied mentalizing capacities. Future studies should therefore consider more emotionally challenging contexts, which may better reveal difficulties that remain undetected in less demanding interactions.

5. Conclusion

By considering the multidimensional nature of parental mentalizing using a person-centered approach, this study provides an initial portrait of the intricate associations between verbal and embodied aspects of parental mentalizing. This study emphasizes the importance of considering both verbal and nonverbal aspects and their complementarity in predicting parent–infant attachment. Adding to current knowledge on parental mentalizing, this study supports distinct profiles of parental mentalizing and their associations with interactional factors, and differential effects on later infant attachment, which may prove both empirically and clinically in further research and guiding early childhood clinical practice.

CRediT authorship contribution statement

Julien Morizot: Writing – review & editing, Visualization, Formal analysis. **Pier-Olivier Caron:** Writing – review & editing, Formal analysis. **Annie Bernier:** Writing – review & editing, Conceptualization. **Jean-Pascal Lemelin:** Project administration, Funding acquisition. **George M. Tarabulsy:** Writing – review & editing, Project administration, Methodology, Funding acquisition, Conceptualization. **Elizabeth Meins:** Writing – review & editing, Project administration, Methodology, Funding acquisition, Conceptualization. **Neta Rein:** Data curation, Conceptualization. **Dana Shai:** Writing – review & editing, Project administration, Methodology, Funding acquisition, Conceptualization. **Karine Gagné:** Writing – review & editing, Writing – original draft,

Visualization, Project administration, Methodology, Formal analysis, Data curation, Conceptualization.

Declaration of Competing Interest

The data that support the findings are available from the corresponding author upon reasonable request.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.infbeh.2025.102113.

Data availability

Data will be made available on request.

References

Afek, E., Lev-Wiesel, R., Federman, D., & Shai, D. (2022). The mediating role of parental embodied mentalizing in the longitudinal association between prenatal spousal support and toddler emotion recognition. *Infancy, 27*(3), 609–629. https://doi.org/10.1111/infa.12462

Ainsworth, M. D., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Lawrence Erlbaum.

Aldrich, N. J., Chen, J., & Alfieri, L. (2021). Evaluating associations between parental mind-mindedness and children's developmental capacities through meta-analysis. *Developmental Review, 60*, Article 100946. https://doi.org/10.1016/j.dr.2021.100946

Arkle, P., Larkin, F., Wang, Y., Lee, Y., Fernandez, A., Li, L. Y., & Meins, E. (2023). Early psychosocial risk factors and postnatal parental reflective functioning. *Infancy, 28*(5), 864–881.

Asparouhov, T., & Muthén, B. (2021). Auxiliary variables in mixture modeling: Using the BCH method in Mplus to estimate a distal outcome model and an arbitrary second model. *Mplus Web Notes, 36*, 1–41.

Bakk, Z., & Vermunt, J. K. (2016). Robustness of stepwise latent class modeling with continuous distal outcomes. *Structural Equation Modeling: A Multidisciplinary Journal, 23*(1), 20–31. https://doi.org/10.1080/10705511.2014.955104

Berthelot, N., Lemieux, R., Garon-Bissonnette, J., Lacharité, C., & Muzik, M. (2019). The protective role of mentalizing: Reflective functioning as a mediator between child maltreatment, psychopathology and parental attitude in expecting parents. *Child abuse Neglect, 95*, Article 104065. https://doi.org/10.1016/j.chiabu.2019.104065

Bowlby, J. (1982). Attachment and loss: Retrospect and prospect. *American Journal of Orthopsychiatry, 52*(4), 664–678.

Bretherton, I., & Munholland, K. A. (2008). Internal working models in attachment relationships: Elaborating a central construct in attachment theory. In J. Cassidy, & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2nd ed., pp. 102–127). The Guilford Press.

Camoirano, A. (2017). Mentalizing makes parenting work: A review about parental reflective functioning and clinical interventions to improve it. *Frontiers in Psychology, 8*(14), 1–12. https://doi.org/10.3389/fpsyg.2017.00014

Cassidy, J., & Shaver, P. R. (2016). *Handbook of attachment: Theory, research, and clinical applications* (3rd ed.). The Guilford Press.

Demers, I., Bernier, A., Tarabulsy, G. M., & Provost, M. A. (2010). Maternal and child characterisctics as antecedents of maternal mind-mindedness. *Infant Mental Health Journal, 31*(1), 94–112.

Finch, W. H., & Bronk, K. C. (2011). Conducting confirmatory latent class analysis using Mplus. *Structural Equation Modeling, 18*(1), 132–151.

Fonagy, P., & Luyten, P. (2009). A developmental, mentalization-based approach to the understanding and treatment of borderline personality disorder. *Development and psychopathology, 21*(4), 1355–1381.

Fonagy, P., Steele, H., & Steele, M. (1991). Maternal representations of attachment during pregnancy predict the organization of infant-mother attachment at one year of age. *Child Development, 62*(5), 891–905. https://doi.org/10.1111/j.1467-8624.1991.tb01578.x

Gagné, K., Lemelin, J.-P., & Tarabulsy, G. M. (2021). Non-verbal and verbal parental mentalization as predictors of infant attachment security: Contributions of parental embodied mentalizing and mind-mindedness and the mediating role of maternal sensitivity. *Infant Behavior and Development, 65*, 1–11. https://doi.org/10.1016/j.infbeh.2021.101622

Gagné, K., Lemelin, J. P., & Tarabulsy, G. M. (2023). Mother-infant interaction context matters for verbal and non-verbal parental mentalization: An initial portrait of associations between parental embodied mentalizing, mind-mindedness, and maternal characteristics in a structured and unstructured context. *Frontiers in Psychology, 14*, 1–9. https://doi.org/10.3389/fpsyg.2023.1176502

Hollingshead, A. A. (1975). *Unpublished manuscript. Four-factor index of social status*. Yale University.

Howard, M. C., & Hoffman, M. E. (2018). Variable-centered, person-centered, and person-specific approaches: Where theory meets the method. *Organizational Research Methods, 21*(4), 846–876. https://doi.org/10.1177/1094428117744021

Ierardi, E., Dascalu, A., Shai, D., Spencer, R., & Riva Crugnola, C. (2022). Parental embodied mentalizing: Associations with maternal depression, anxiety, verbal mentalizing, and maternal styles of interaction. *Journal of Affective Disorders, 311*, 472–478. https://doi.org/10.1016/j.jad.2022.05.105

Koren-Karie, N., Oppenheim, D., Dolev, S., Sher, E., & Etzion-Carasso, A. (2002). Mothers' insightfulness regarding their infants' internal experience: Relations with maternal sensitivity and infant attachment. *Developmental Psychology, 38*(4), 534–542. https://doi.org/10.1037//0012-1649.38.4.534

Lanza, S. T., & Cooper, B. R. (2016). Latent class analysis for developmental research. *Child Development Perspectives, 10*(1), 59–64. https://doi.org/10.1111/cdep.12163

Larkin, F., Hayiou-Thomas, M. E., Arshad, Z., Leonard, M., Williams, F. J., Katseniou, N., Malouta, R. N., Marshall, C. R. P., Diamantopoulou, M., Tang, E., Mani, S., & Meins, E. (2021). Mind-Mindedness and stress in parents of children with developmental disorders. *Journal of Autism and Developmental Disorders, 51*(2021), 600–612. https://doi.org/10.1007/s10803-020-04570-9

Larkin, F., Oostenbroek, J., Lee, Y., Hayward, E., & Meins, E. (2019). Proof of concept of a smartphone app to support delivery of an intervention to facilitate mothers' mind-mindedness. *PloS One, 14*(8), 1–16.

Law, A. R. M., Thackeray, L., Morris, E., & Sleed, M. (2021). Capturing parental mentalization: A thematic analysis of expert perspectives in elements required for valid measures. *Journal of Infant, Child, and Adolescent Psychotherapy, 20*(2), 190–205. https://doi.org/10.1080/15289168.2021.1918044

Lezhnina, O., & Kismihók, G. (2022). Latent class cluster analysis: Selecting the number of clusters. *MethodsX, 9*, Article 101747. https://doi.org/10.1016/j.mex.2022.101747

Lindblom, J., Flykt, M., Tolvanen, A., Vänskä, M., Tiitinen, A., Tulppala, M., & Punamäki, R.-L. (2014). Dynamic family system trajectories from pregnancy to child's first year: Dynamic family system trajectories. *Journal of Marriage and Family, 76*(4), 796–807. https://doi.org/10.1111/jomf.12128

Lindblom, J., Pajulo, M., Nolvi, S., Tervahartiala, K., Karlsson, H., Karlsson, L., & Korja, R. (2022). Early pathways of maternal mentalization: Associations with child development in the FinnBrain birth cohort study. *Frontiers in Psychology, 13*, 1–20.

Luyten, P., Campbell, C., Allison, E., & Fonagy, P. (2020). The mentalizing approach to psychopathology: State of the art and future directions. *Annual Review of Clinical Psychology, 16*(1), 297–325. https://doi.org/10.1146/annurev-clinpsy-071919-015355

Luyten, P., & Fonagy, P. (2018). The stress–reward–mentalizing model of depression: An integrative developmental cascade approach to child and adolescent depressive disorder based on the Research Domain Criteria (RDoC) approach. *Clinical Psychology Review, 64*, 87–98.

Luyten, P., Nijssens, L., Fonagy, P., & Mayes, L. C. (2017). Parental reflective functioning: Theory, research, and clinical applications. *The Psychoanalytic Study of the Child, 70*(1), 174–199. https://doi.org/10.1080/00797308.2016.1277901

Lyons-Ruth, K., & Jacobvitz, D. (2008). Attachment disorganization: Genetic factors, parenting contexts, and developmental transformation from infancy to adulthood. In In. J. Cassidy, & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2nd ed., pp. 666–697). The Guilford Press.

Madigan, S., Bakermans-Kranenburg, M. J., Van Ijzendoorn, M. H., Moran, G., Pederson, D. R., & Benoit, D. (2006). Unresolved states of mind, anomalous parental behavior, and disorganized attachment: A review and meta-analysis of a transmission gap. *Attachment Human Development, 8*(2), 89–111. https://doi.org/10.1080/14616730600774458

Madsen, E. B., Egmose, I., Stuart, A. C., Thode Krogh, M., Wahl Haase, T., Karstoft, K. I., & Væver, M. S. (2025). Profiles of parental reflective functioning and mind-mindedness in first-time parents of 4-month-old infants. *Infant Mental Health Journal*, 1–16. https://doi.org/10.1002/imhj.70021

Main, M., & Solomon, J. (1990). Procedures for identifying infants as disorganized/disoriented during the Ainsworth Strange Situation. In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the preschool years: Theory, research, and intervention* (pp. 121–160). The University of Chicago Press.

Masyn, K. E. (2013). Latent class analysis and related techniques. In T. D. Little (Ed.), *The Oxford Handbook of Quantitative Methods: Statistical Analysis* (pp. 551–611). Oxford University Press.

McMahon, C. A., & Bernier, A. (2017). Twenty years of research on parental mind-mindedness: Empirical findings, theoretical and methodological challenges, and new directions. *Developmental Review, 46*, 54–80. https://doi.org/10.1016/j.dr.2017.07.001

Meins, E. (1999). Sensitivity, security and internal working models: Bridging the transmission gap. *Attachment Human Development, 1*(3), 325–342. https://doi.org/10.1080/14616739900134181

Meins, E., Fernyhough, C., Fradley, E., & Tuckey, M. (2001). Rethinking maternal sensitivity: Mothers' comments on infants' mental processes predict security of attachment at 12 months. *Journal of Child Psychology and Psychiatry, 42*(5), 637–648.

Meins, E., & Fernyhough, C. (2015). Mind-mindedness coding manual, Version 2.2. Unpublished manuscript. University of York.

Meins, E., Fernyhough, C., de Rosnay, M., Arnott, B., Leekam, S. R., & Turner, M. (2012). Mind-mindedness as a multidimensional construct: Appropriate and nonattuned mind-related comments independently predict infant–mother attachment in a socially diverse sample. *Infancy, 17*(4), 393–415.

Morin, A. J. S., & Litalien, D. (2019). Mixture modeling for lifespan developmental research. In A. J. S. Morin, & D. Litalien (Eds.), *Oxford Research Encyclopedia of Psychology*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190236557.013.364.

Muthén, L. K., & Muthén, B. O. (2002). How to use a Monte Carlo simulation study to decide on sample size and determine power. *Structural Equation Modeling, 9*(4), 599–620. https://doi.org/10.1207/S15328007SEM0904_8

Muthén, L. K., & Muthén, B. O. (2018). *Mplus user's guide. (version 8)*, 1998. Muthén & Muthén.

Nylund-Gibson, K., & Choi, A. Y. (2018). Ten frequently asked questions about latent class analysis. *Translational Issues in Psychological Science, 4*(4), 440–461. https://doi.org/10.1037/tps0000176

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling, 14*(4), 535–569.

Riva Crugnola, C., Ierardi, E., & Canevini, M. P. (2018). Reflective functioning, maternal attachment, mind-mindedness, and emotional availability in adolescent and adult mothers at infant 3 months. *Attachment Human Development, 20*(1), 84–106. https://doi.org/10.1080/14616734.2017.1379546

Shai, D. (2017). Unpublished Manuscript. Birkbeck University of London. *The Parental Embodied Mentalizing (PEM) Coding System Manual*.

Shai, D., & Belsky, J. (2011a). Parental embodied mentalizing: Let's be explicit about what we mean by implicit. *Child Development Perspectives, 5*(3), 187–188. https://doi.org/10.1111/j.1750-8606.2011.00195.x

Shai, D., & Belsky, J. (2011b). When words just won't do: Introducing parental embodied mentalizing: Introducing parental embodied mentalizing. *Child Development Perspectives, 5*(3), 173–180. https://doi.org/10.1111/j.1750-8606.2011.00181.x

Shai, D., & Belsky, J. (2017). Parental embodied mentalizing: How the nonverbal dance between parents and infants predicts children's socio-emotional functioning. *Attachment and Human Development, 19*(2), 191–219.

Shai, D., Dollberg, D., & Szepsenwol, O. (2017). The importance of parental verbal and embodied mentalizing in shaping parental experiences of stress and coparenting. *Infant Behavior and Development, 49*, 87–96. https://doi.org/10.1016/j.infbeh.2017.08.003

Shai, D., Laor Black, A., Spencer, R., Sleed, M., Baradon, T., Nolte, T., & Fonagy, P. (2022). Trust me! Parental embodied mentalizing predicts infant cognitive and language development in longitudinal follow-up. *Frontiers in Psychology, 13*, Article 867134. https://doi.org/10.3389/fpsyg.2022.867134

Shai, D., & Meins, E. (2018). Parental embodied mentalizing and its relation to mind-mindedness, sensitivity, and attachment security. *Infancy, 23*(6), 857–872. https://doi.org/10.1111/infa.12244

Shakeel, A., Khan, S., & Shamama-tus-Sabah, S. (2021). Home chaos and self-regulation: Moderating role of gender between home chaos and effortful control. *Journal of Rawalpindi Medical College, 25*(3), 400–404.

Shin, M., No, U., & Hong, S. (2019). Comparing the robustness of stepwise mixture modeling with continuous nonnormal distal outcomes. *Educational and psychological Measurement, 79*(6), 1156–1183. https://doi.org/10.1177/0013164419839770

Sjolseth, S. R., Frosch, C. A., Owen, M. T., & Redig, S. L. (2024). Do toys get in the way? The duration of shared emotional experiences is longer when mothers engage their infants without toys. *Infant Mental Health Journal, 45*(1), 3–10. https://doi.org/10.1002/imhj.22092

Slade, A. (2005). Parental reflective functioning: An introduction. *Attachment Human Development, 7*(3), 269–281. https://doi.org/10.1080/14616730500245906

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

Sleed, M., Slade, A., & Fonagy, P. (2020). Reflective functioning on the parent development interview: Validity and reliability in relation to socio-demographic factors. *Attachment Human Development, 22*(3), 310–331. https://doi.org/10.1080/14616734.2018.1555603

Smaling, H. J. A., Huijbregts, S. C. J., Suurland, J., Van Der Heijden, K. B., Van Goozen, S. H. M., & Swaab, H. (2015). Prenatal reflective functioning in primiparous women with a high-risk profile. *Infant Mental Health Journal, 36*, 251–261. https://doi.org/10.1002/imhj.21506

Spurk, D., Hirschi, A., Wang, M., Valero, D., & Kauffeld, S. (2020). Latent profile analysis: A review and "how to" guide of its application within vocational behavior research. *Journal of Vocational Behavior, 120*, Article 103445. https://doi.org/10.1016/j.jvb.2020.103445

Stern, D. N. (1985). The inter personal world of the infant. *Basic Books*.

Stern, D. N. (2010). *Forms of vitality: Exploring dynamic experience in psychology, the arts, psychotherapy, and development*. Oxford University Press.

Suttora, C., Spinelli, M., Aureli, T., Fasolo, M., Lionetti, F., Picciolini, O., Ravasi, M., & Salerni, N. (2020). Mind-mindedness and parenting stress: A cross-sectional study in a cohort of mothers of 3-month-old full-term and preterm infants. *International Journal of Environmental Research and Public Health, 17*(21), 7735. https://doi.org/10.3390/ijerph17217735

Thompson, R. A., Simpson, J. A., & Berlin, L. J. (2022). Taking perspective on attachment theory and research: Nine fundamentale questions. *Attachement Human Development, 24*(5), 543–560.

Trepiak, P., Deneault, A. A., & Bureau, J. F. (2025). A systematic review and meta-analysis of parental mentalization in fathers and mothers. *Infant Mental Health Journal*, 1–18. https://doi.org/10.1002/imhj.70001

Væver, M. S., Cordes, K., Stuart, A. C., Tharner, A., Shai, D., Spencer, R., & Smith-Nielsen, J. (2020). Associations of maternal sensitivity and embodied mentalizing with infant-mother attachment security at one year in depressed and non-depressed dyads. *Attachment Human Development, 24*(2), 115–132. https://doi.org/10.1080/14616734.2020.1861035

van der Gaag, M. A. E. (2023). A person-centered approach in developmental science: Why this is the future and how to get there. *Infant and Child Development, 32*(6), Article e2478.

Van Ijzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2008). Attachment, emerging from empirical evidence. *Current Opinion in Psychology, 1*(1), 5–9.

Waters, E., & Cummings, E. M. (2000). A secure base from which to explore close relationships. *Child Development, 71*(1), 164–172.

Wendelboe, K. I., Reijman, S., Madsen, E. B., Støve, L. L., Stuart, A. C., Smith-Nielsen, J., & Væver, M. S. (2024). Maternal mentalizing and quality of interactive behavior with their infant in the first year postpartum: A meta-analysis. *Developmental Review, 73*, Article 101136.

Zeegers, M. A. J., Colonnesi, C., Stams, G.-J. J. M., & Meins, E. (2017). Mind matters: A meta-analysis on parental mentalization and sensitivity as predictors of infant–parent attachment. *Psychological Bulletin, 143*(12), 1245–1272. https://doi.org/10.1037/bul0000114

Zimmer-Gembeck, M. J., Thomas, R., Hendrickson, K., Avdagic, E., Webb, H., & McGregor, L. (2013). Maternal emotional distress, abuse risk, and children's symptoms: Child gender as a moderator of parent sensitivity as a mediator. *Infant and Child Development, 22*, 480–500. https://doi.org/10.1002/icd.1804