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Running head: PARENTAL PERSONALITY AND CHILD BEHAVIOUR

Parental Affective Personality and Children's Self-Reported Internalising and Externalising Behaviour

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Data are under the jurisdiction of the CHU Ste-Justine Research Ethics committee and subject to current provincial and national privacy laws guiding their ethical use in Québec, Canada. To submit a request, please visit the following website:

<u>http://gripinfo.ca/grip/public/www/etudes/en/dadprocedures.asp?langue=en</u> or contact the corresponding author.

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Parental Affective Personality and Children's Self-Reported Internalising and Externalising Behaviour

Abstract

Past research has demonstrated associations between parental personality traits and children's behaviour. However, fathers have been largely excluded from this research, and mothers often rate both their own personality and their child's behaviour, contributing to shared method variance. This study contributes to the literature by examining associations between parental biologically based affective personality traits, analysed separately for mothers and fathers, and seven- and eight-year-old children's self-reported internalising and externalising behaviours. Data were analysed for 272 mother-child dyads and 208 father-child dyads. A series of multiple linear regressions was utilised to test associations between mothers' and fathers' traits of ANGER, SADNESS, FEAR, PLAY, SEEKING and CARE, assessed using the Affective Neuroscience Personality Scales (ANPS), and children's self-reported internalising and externalising behaviours, assessed using the Berkeley Puppet Interview. Results revealed that higher ANPS ANGER scores among mothers were associated with more externalising behaviours in boys. Mothers with higher scores on SEEKING had sons with lower scores on externalising behaviours, while mothers with higher PLAY scores had sons with lower scores on internalising behaviours. Fathers with higher ANPS SADNESS scores had children with greater internalising behaviours, while fathers with greater FEAR traits had children with lower internalising behaviours. Indirect associations through harsh or positive parenting were not significant. Findings demonstrated that ANPS traits of ANGER, PLAY and SEEKING for mothers and FEAR and SADNESS for fathers are associated with children's self-reported externalising and internalising behaviours. This study adds to the literature on biologically based parental affective personality and child internalising and externalising behaviours. Keywords: parent, personality, child, behaviour, externalising, internalising

Approaches to the study of personality

Personality encompasses expectations and beliefs about the self and others and influences how people respond to their environment (Rothbart, 1989). While past research has largely employed lexical conceptualisations of personality such as the Five Factor Model (Costa & McCrae, 1992), their dimensions are created through qualitative adjectives, theoretical language, and factor analyses, and are thus subject to cultural variance (Knežević, Lazarević, Montag & Davis, 2020). Biological bases of personality, such as the Affective Neuroscience Personality Scales (ANPS), are thus important to consider given their phylogenetic origin and cross-cultural consistency (Knežević et al., 2020; Montag & Panksepp, 2020). The ANPS comprises six primary emotional systems found across mammals: ANGER (i.e., rage system that encourages resource guarding including defensive protection of self and loved-ones against threat; rapid irritation and low frustration tolerance), SADNESS (i.e., system to counteract isolation and separation from loved ones through social separation distress and loneliness), FEAR (i.e., system to manage threats by eliciting defensive mechanisms such as the freeze/flight response; anxiety, worry, tension), PLAY (i.e., system for social competence, bonding and regulation of emotions; laughter and having fun with others), SEEKING (i.e., motivationalemotional system to achieve goals, anticipate new positive experiences, and explore the environment) and CARE (i.e., emotional and nurturing urges to care for children and others, which in turn increases offspring survival; Davis & Panksepp, 2011; Montag, Elhai & Davis, 2021). These systems are capitalised in order to distinguish them from emotion terms commonly employed in the literature (Montag et al., 2021). The ANPS has previously been compared to lexically-based personality measures, such as the Five-Factor Model: Extraversion was found to be positively linked to PLAY, while agreeableness was positively correlated with CARE and

inversely related to ANGER. Openness to experience was positively associated with ANPS SEEKING traits. Finally, neuroticism was positively related to the ANPS subscales of ANGER, SADNESS and FEAR, whereas conscientiousness was negatively associated with these subscales (Montag & Panksepp, 2020). However, despite their correlation, the six dimensions of the biologically based ANPS have not been found to map directly, on a one-to-one basis, onto personality traits derived from lexically-based measures (see Knežević et al., 2020). In addition, ANPS systems have been linked with parent-child bonding and offspring survival (Montag et al., 2021). This suggests the relevance of utilising biologically based conceptualisations of personality in research pertaining to parents and children.

Parental personality and child behaviour difficulties

Parental personality has been associated with child behaviour difficulties, generally classified as internalising (anxiety, depression and social withdrawal) or externalising (irritability, aggression, oppositionality, hyperactivity and impulsivity; Rosenfield, Lennon & White, 2005). Past research has evaluated the links between lexically-informed parental personality traits and child behaviour difficulties: higher levels of parental neuroticism (Prinzie, Onghena & Hellinckx, 2005a), openness to experience (Oliver, Guerin & Coffman, 2009), extraversion (Nigg & Hinshaw, 1998; Puff & Renk, 2016), and lower levels of agreeableness and conscientiousness (Oliver et al., 2009; Xing, Gao, Liu, Ma & Wang, 2018), have been associated with higher levels of externalising behaviours in their offspring. These same parental traits have also been associated with children's internalising behaviours (Crawford, Schrock & Woodruff-Borden, 2011; Puff & Renk, 2016).

However, to our knowledge, only one study has assessed associations between parental biologically based personality traits based on ANPS profiles and school-aged children's

behaviour difficulties (Orri et al., 2018). This study, based on data from the same cohort as the current study, utilised latent classes to capture broad parental ANPS personality profiles and studied associations with parent-reported child internalising and externalising behaviours. The three latent parental ANPS profiles were *low negative emotions* (greater levels of CARE, PLAY and SEEKING, lower levels of ANGER, SADNESS, and FEAR), *balanced* (average levels of all subscales) and *high emotional* (greater levels of ANGER, SADNESS, FEAR and CARE) (Orri et al., 2018). When considering direct associations between parental ANPS profiles on parent-reported child behaviours, Orri and colleagues (2018) found that mothers in the high emotional ANPS profile reported greater internalising behaviours in their sons and more externalising behaviours in their daughters. In addition, mothers in the low negative emotion ANPS profile had sons with fewer internalising behaviours. No direct link between fathers' ANPS personality profiles and child behaviour was found although an indirect effect through parenting was reported (see below).

Direct and indirect role of parenting. Previous research has explored the relevance of direct and indirect pathways to explain the associations between parental personality and child behaviours. Direct pathways could occur through genetics or observational learning (Brook, Whiteman & Zheng, 2002; Prinzie et al., 2005b). Indirect pathways are also considered relevant because parental personality can influence parenting practices, which in turn are associated with child behaviour (Prinzie et al., 2005a; Orri et al., 2018; Prinzie et al., 2005b; Puff & Renk, 2016). For instance, higher levels of parental neuroticism and lower agreeableness have been linked to more harsh and less positive parenting practices (Prinzie et al., 2009), which in turn were associated with higher levels of externalising behaviours in children (Brook, Whiteman & Zheng, 2002; Prinzie et al., 2005b). Furthermore, higher scores on maternal conscientiousness

have been linked to more positive parenting practices such as limit setting, which have been associated with lower levels of externalising behaviours in early adolescence (Oliver et al., 2009). In addition to assessing direct pathways, Orri and colleagues (2018) assessed the mediating effect of harsh parenting practices on the association between parental ANPS profiles and child internalising and externalising behaviours. Parenting practices and personality were measured when children were four years of age, after which parent-reported child behaviours were measured at seven to eight years of age. Higher levels of harsh parenting were found to mediate the association between mothers in the high emotional profile and daughters' elevated internalising and externalising behaviours. Lower levels of harsh parenting mediated the relationship between mothers in the low negative emotion profile and lower levels of internalising and externalising behaviours in daughters. Finally, lower levels of harsh parenting practices mediated the association between fathers in the low negative emotions profile and lower levels of externalising behaviours in sons (Orri et al., 2018).

However, the extent to which parents' individual subscales of the biologically based ANPS relate to children's own reports of their internalising and externalising behaviours is unknown. Determining whether certain subscales might be particularly salient for children's behaviour, either directly or indirectly through parenting practices, is relevant for identifying prevention targets.

Moderating role of child sex

Although sex differences in internalising behaviours are generally not reported prior to puberty, girls are approximately twice as likely to experience internalising behaviours after puberty, while boys are twice as likely to demonstrate externalising behaviours throughout their lifetime (Nolen-Hoeksema & Rusting, 2003). In addition, differential associations between

parental ANPS scores and child behaviour in relation to child sex have previously been found (Orri et al., 2018). However, while some research indicates that child sex may moderate the link between parental personality and child behaviour (Nigg & Hinshaw, 1998; Orri et al., 2018), other studies did not find evidence of such moderation (Prinzie et al., 2005a).

Gaps in the literature

While previous research has demonstrated interesting links between parental personality and children's internalising and externalising behaviours, there are a number of gaps in the literature. First, studies to date have used more traditional, lexically-based personality measures such as the Five Factor Model, while very few have studied biologically based conceptualisations of personality such as the ANPS (Knežević et al., 2020). Second, the only study that examined associations between parental ANPS traits and child behaviour utilised latent ANPS profiles (Orri et al., 2018). Thus, it is unknown whether specific ANPS subscales or sex-specific interactions are particularly salient for children's behaviour difficulties. Third, although fathers were found to play an important role in their children's behaviours (Jeynes, 2016), they have been largely absent in studies. Thus, knowledge on the associations between fathers' personality traits and child internalising and externalising behaviours is limited. Finally, in the majority of these studies, parents rated their own personality traits as well as their children's internalising and externalising behaviours. This may have introduced bias due to shared method variance, such that part of relevant associations may be explained by the fact that the same person assessed both variables (Kerr, Lunkenheimer & Olson, 2007). Further work is necessary to better understand associations between biologically based parental personality traits and independent assessments of children's behaviour (e.g., such as children's self-reports). The current study contributes to the literature by addressing these important limitations.

Objectives

This study aimed to examine associations between parental personality traits, assessed separately for mothers and fathers, and children's self-reported internalising and externalising behaviours within a community sample of 272 families. We address previous limitations by examining associations between levels of mothers' and fathers' affective personality traits (assessed using the ANPS) and children's self-reported internalising and externalising behaviours, while also considering the role of positive (warm, involved) and harsh (coercive, punitive) parenting. More specifically, this study aimed to 1) probe whether certain parental affective personality traits are associated with children's self-reported internalising or externalising behaviours, and 2) whether these pathways are direct or operate indirectly through positive and or harsh parenting. 3) Within the context of each of these objectives, we tested whether child sex moderates these associations.

Hypotheses

Given the dearth of literature studying associations between parental ANPS and children's emotional and behaviour difficulties, we based our hypotheses on previous findings pertaining to associations between parental personality traits (not specifically the ANPS) and child behaviour difficulties.

Parental ANPS subscales. The ANPS subscales of ANGER, SADNESS and FEAR have been found to be positively related to neuroticism and negatively associated with consciousnesseses (Panksepp, 2003). Previous work has reported that higher levels of maternal neuroticism were associated with increased externalising (Oliver et al., 2009; Puff & Renk, 2016) and internalising (Kochanska et al., 1997) behaviours in children. Similarly, higher levels of consciousness were associated with decreased externalising behaviours in mothers (Puff &

Renk, 2016) and fathers (Prinzie et al., 2005a). Thus, it was predicted that higher levels of maternal and/or paternal ANGER, SADNESS and FEAR on the ANPS would be associated with greater levels of self-reported externalising and internalising behaviours in children.

The ANPS dimension of PLAY has been shown to be associated with extraversion, while the subscale of SEEKING has been linked to openness to experience (Panksepp, 2003). Since parental extraversion and openness to experience have been found to be positively correlated with children's externalising behaviours (Nigg & Hinshaw, 1998; Puff & Renk, 2016), we hypothesised that children of mothers and/or fathers with higher ANPS traits of PLAY and SEEKING would report greater externalising behaviours.

The ANPS dimension of CARE has been positively correlated with maternal agreeableness (Panksepp, 2003) and lower levels of internalising and externalising behaviours in school-aged children (Puff & Renk, 2016). Thus, it was hypothesised that higher scores on maternal CARE would be associated with lower levels of child self-reported internalising and externalising behaviours. Since less was known about the associations between father CARE and child internalising and externalising behaviours, hypotheses pertaining to fathers were exploratory.

Indirect pathway of parenting practices. Given that indirect associations between parental ANPS and children's internalising and externalising behaviours have been found through positive and harsh parenting practices (Orri et al., 2018), we hypothesised that higher levels of ANPS traits of ANGER, SADNESS and FEAR in mothers and/or fathers would be indirectly linked to elevated levels of internalising and externalising behaviours through harsh parenting. Higher scores of maternal CARE would be indirectly associated with fewer

internalising and externalising behaviours through higher scores on positive parenting. Hypotheses pertaining to father CARE and parenting style were exploratory.

Moderating role of child sex. While previous literature has found some evidence that child sex moderated both direct and indirect pathways, results to date are not consistent (Nigg & Hinshaw, 1998; Orri et al., 2018). Thus, our hypotheses pertaining to differential effects of sex are exploratory.

Methodology

Participants

Five hundred and fifteen families who had taken part in a larger perinatal survey were invited to participate in the longitudinal community-based study 'Étude de Milieu de Garde' (EMIGARDE; translation: Study on Child Care Services; for more information on initial recruitement see Côté et al., 2013). Children were born between June 2003 and April 2004. Families were re-contacted before their child's second birthday to participate in the EMIGARDE study. Exclusion criteria included children who had been hospitalised at birth and mothers who did not speak English or French or who were adolescents at the time of their child's birth. Participants, which included only one target child per household, were assessed longitudinally. The first EMIGARDE data collection of 497 families took place in 2005-2006 when children were 2 years of age. Subsequent data collections took place in 2006-2007 (3 years, n = 440), 2007-2008 (4 years, n = 396), 2010-2011 (5 years, n = 311), and finally in 2011-2012 (7-8 years, n = 326). This study focused solely on the 2011-2012 data collection, which comprised a home visit with mothers and their child. While 326 mothers completed the ANPS questionnaire, only 310 children had useable self-reported measures of their behaviours and 5 were excluded based on a diagnosis of Autism Spectrum Disorder, resulting in 305 families. After missing data for

relevant covariates were considered, a total of 272 mother-child dyads remained. Although fathers' participation was requested, 64 biological fathers were either not present at the home visit or did not return the questionnaires by post, resulting in 208 father-child dyads. Ethics approval was obtained from the research centre of CHU Sainte-Justine in Montréal, Québec. During the home visits, separate interviews took place with mothers and their child, and children's self-reported data were obtained using the Berkeley Puppet Interview (described below). Furthermore, mothers and fathers completed questionnaires separately, which included the ANPS measure and questions that pertained to parenting practices. Families received compensation for participation in the study. See Table 1 for information concerning demographic variables.

Measures

Independent variable. The Affective Neuroscience Personality Scales (ANPS; Davis & Panksepp, 2011) were used to assess parental affective personality at the child's age of seven to eight years. The ANPS is made up of six biologically based systems, including ANGER (e.g., "I tend to get irritated if someone [stops] me from doing what I want to do", SADNESS (e.g., "I often feel lonely"), FEAR (e.g., "I often worry about the future"), PLAY (e.g., "...I am a very fun-loving person"), SEEKING (e.g., "I really enjoy looking forward to new experiences"), and CARE (e.g., "I like taking care of children"). The measure includes a spirituality dimension that was not utilised in the present study given that the subscale does not correspond to biologically based primary affect, but rather a secondary, culturally-influenced process (Davis & Panksepp, 2011). There are 14 items per subscale and each item ranges from 0 (Disagree) to 3 (Strongly agree). Standardised sum scores were created for each of the six subscales although only subscales with at least 90% of the items endorsed by a participant were included in the analyses.

ANPS subscales were found to be reliable, as computed by Cronbach's alphas, ranging from .69 to .88 for mothers and fathers. The ANPS was administered in French or English, depending on the language preference of the participants; both versions of the ANPS were validated and found to be stable over time (Orri et al., 2017; Pahlavan, Mouchiroud, Zenasni & Panksepp, 2008; Pingault, Pouga, Grezes & Berthoz, 2012).

Dependent Variable. The Berkeley Puppet Interview (BPI; Ablow & Measelle, 1993) symptomatology module was used to assess children's self-reported internalising and externalising behaviours in their language of choice (French or English). The broadband scales of internalising (subscales: depression, anxiety, separation anxiety, emotional problems) and externalising behaviours (subscales: oppositional behaviour, hostility, conduct problems, relational aggression, inattention and impulsivity) were utilised. For each of the 59 items administered, children indicated the puppet with whom they most identified (e.g., Puppet 1: 'I am a sad kid' vs. Puppet 2: 'I am not a sad kid'). Items were then scored from positive to negative on a seven-point scale, with higher scores indicating more behaviour difficulties. The approximately 20-minute interviews conducted by research assistants were videotaped and later scored by two doctoral students who were trained to code the measure and had not conducted those interviews. Inter-rater reliability was above 0.90 for the 20% of the sample that was double coded. Over half of the items in each of the subscales that made up the broadband scales had to be completed by a participant for the data to be included in the analyses. Since the distributions of the subscales and broadband scales were slightly skewed, a log transformation was employed for all subscales. Broadband scales were then standardised and found to be reliable, as computed by Cronbach's alphas, for internalising (20 items; $\alpha = 0.77$) and externalising (39 items; $\alpha =$ 0.85) behaviours. The BPI was used in studies assessing internalising and externalising

difficulties in middle childhood (Arseneault, Kim-Cohen, Taylor, Caspi & Moffitt, 2005; Measelle, Ablow, Cowan & Cowan, 1998) and their psychometric properties were found to be satisfactory (Measelle et al., 1998; Ringoot et al., 2015).

Indirect pathway: parenting practices. A modified version of the Parent Practices Scale (Strayhorn & Weidman, 1988) that evaluated the nature of daily parent-child interactions (see Orri et al., 2018 for details) was completed by both mothers and fathers to assess parenting practices. Parents were asked to rate the frequency of positive (e.g., "comforting your child when [they're] sad") and negative (e.g., "hitting your child when [they're] difficult") interactions with their child over the past year on a 7-point Likert scale from never to many times each day. Separate mean scores for mothers and fathers for harsh (i.e., 7 items that depict punitive disciplinary tactics) and positive parenting practices (i.e.,10 items characterised by warmth, involvement and praise) were generated and found to be reliable ($\alpha \ge .75$).

Moderating variable. Child sex assigned at birth was tested as a potential moderator for the associations between parental ANPS subscales and child internalising and externalising behaviours.

Covariates. Potential confounders were selected on the basis of previous literature as well as those variables that were significantly correlated with the ANPS and BPI.

Child Verbal Ability. Children's receptive vocabulary was assessed using the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981) and used to control for question comprehension on the BPI. The French equivalent of the measure (Échelle de vocabulaire en images Peabody), which has been validated for French-Canadian populations, was used for francophone participants (Dunn, Dunn & Thériault-Whalen, 1993). A total score for verbal ability in the child's preferred language was used.

Language of testing. The language of testing (French or English) was significantly correlated with BPI scores such that children who completed the interviews in French had lower internalising and externalising scores on the BPI. Language of testing was thus included as a covariate in subsequent analyses to control for language difference linked to questionnaire versions.

Socioeconomic status. Previous literature has reported associations between socioeconomic status and children's behaviour difficulties. More specifically, lower socioeconomic status has been linked to higher scores for externalising and internalising behaviours in children (Keiley, Bates, Dodge & Pettit, 2000). We considered the following socioeconomic indicators in this study, which were created using data collected from participants in 2011-2012.

Maternal education was defined by the highest level of completed education and classified as secondary (secondary education or less), college (college or intermediate vocational education), or higher education (university).

Single parenthood was defined as living in a single parent family at the most recent point of data collection.

Family income, defined as the total income before tax for all household members during the last 12 months, was dichotomised with a cut off of \$40,000 CAD per year, based on a low-income variable generated by Statistics Canada in 2013 for a family of four in 2011 and 2012, when the data collection took place (Statistics Canada, 2013).

Statistical analysis approach

In a first step, multiple linear regression analyses were performed using the Statistical Package for the Social Sciences (SPSS 27.0) to examine links between the six standardised

ANPS subscales and child internalising and externalising behaviours. Separate regression analyses were conducted for mothers and fathers, for child externalising and internalising behaviour, separately, for a total of four regression models. Each model contained the six parental ANPS subscales (mother or father) to examine the unique contribution of the subscales for child behaviour (internalising or externalising behaviour difficulties). These exploratory regressions analyses included moderation by child sex through backwards stepwise multiple regression in addition to all covariates (i.e., child verbal ability, child language of testing, maternal education, family income and single parenthood). While a limit of the backwards stepwise regression approach has been the use of an automated process to determine the best model for confirmatory purposes, it can offer an effective manner by which researchers can evaluate the suitability of multiple variables for future exploratory examination (Ruengvirayudh & Brooks, 2016). Given the exploratory nature of our hypotheses pertaining to parent ANPS interactions with child sex, this approach was considered appropriate to determine which relevant variables (i.e., interactions between parent ANPS subscale and child sex) should be further examined in models.

Next, in the second step, significant associations between parent ANPS subscales and children's behaviour that emerged (main effect or in interaction with child sex) were further probed using the macro add-on Process in SPSS which allows for regression path analyses (Hayes, 2017). Models to test direct and indirect pathways (Hayes, 2017) were employed to assess the presence of direct associations between parental ANPS subscales and child behaviours as well as the indirect pathway through either harsh or positive parenting. We then also tested whether child sex moderated these associations. Separate models were run to test the indirect

pathways of harsh and positive parenting practices. Previously mentioned covariates were included in the model.

The conditional process model was first fitted where both the indirect and direct paths were moderated by child sex (See Figure 1). A model whereby only a direct path moderated by child sex and positive and harsh parenting practices were included as covariates was retained in cases where parenting practices did not emerge as a significant indirect path (See Figure 2).

Results

Descriptive Statistics

Table 1 presents descriptive data for the families included in the analyses, with data for mothers and fathers presented separately given the different number of participants. Attrition analyses between the initial time point of the study (at age two years) and the current sample (at age seven to eight years) revealed that parents who were born outside Canada, were separated or divorced, did not attain their high school diploma or had an annual income under \$40,000 were more likely to discontinue the study. Given that our current sample (n = 272) had fewer participants compared to the initial sample of mother-child dyads (n = 305) and included more mothers than fathers, logistic regression analyses were run to examine whether participating families differed on socio-demographic characteristics or key variables. Two analyses were conducted comparing: (1) the final sample of 272 mother-child dyads to the initial 305; (2) families where fathers completed questionnaires (n = 208) to those where fathers did not complete questionnaires (n = 64). Results revealed no significant difference between the original and final sample of mother-child dyads, while father participation was linked to higher income and being partnered with their child's mother. Please refer to Table 2 for means and standard deviations of maternal and paternal ANPS and parenting practices, and child internalising and externalising behaviours. See Table 3 for correlations among these variables.

Regression Analyses

Mothers. In step 1, regression analyses revealed significant interactions between child sex and mothers' ANPS subscales of ANGER (p = 0.040) and SEEKING (p = 0.047) for child externalising behaviours, as well as between child sex and mother PLAY (p = 0.012) for child internalising behaviours.

These models were thus probed further in step 2. The confidence intervals of the indirect pathways of parenting practices (Model 1, see Figure 1) for maternal ANPS ANGER (harsh: β = 0.03, 95% CI [-0.01, 0.09]; positive: $\beta = 0.003$, 95% CI [-0.004, 0.03]), SEEKING (harsh: $\beta =$ 0.002, 95% CI [-0.004, 0.03]; positive: $\beta = -0.004$, 95% CI [-0.03, 0.003]), and PLAY (harsh: β = 0.001, 95% CI [-0.01, 0.02]; positive: $\beta = 0.002, 95\%$ CI [-0.01, 0.02]) included zero, indicating they were not statistically significant. A direct effects model (Model 2, see Figure 2) whereby child sex moderated maternal ANPS subscales and child behaviour outcomes was therefore retained. Here, we thus added harsh and positive parenting as covariates. Results indicated that mothers' ANGER traits were moderated by child sex; higher maternal ANGER scores were positively associated with greater scores for externalising behaviours for boys ($\beta =$ 0.30, 95% CI [0.12, 0.48], p = 0.001); among girls, this association was not significant ($\beta = 0.04$, 95% CI [-0.14, 0.21], p = 0.69; see Figure 3). Higher SEEKING scores among mothers were negatively associated with externalising behaviours for boys ($\beta = -0.17, 95\%$ CI [-0.34, <-0.003], p = 0.046) whereas such an association was not present for girls ($\beta = 0.09, 95\%$ CI [-0.08, 0.25], p = 0.324; see Figure 4). Higher scores on maternal PLAY were negatively associated with self-

reported internalising behaviours for boys ($\beta = -0.19, 95\%$ CI [-0.38, -0.004], p = 0.046); this association was not found for girls ($\beta = 0.11, 95\%$ CI [-0.07, 0.29], p = 0.22; see Figure 5).

Fathers. In step 1, regression analyses revealed significant main effects of fathers' ANPS SADNESS (p = 0.041) and FEAR (p = 0.012) and child internalising behaviours. We thus moved forward to step 2 where the confidence intervals of the indirect pathways of parenting practices (Model 1, see Figure 1) for paternal SADNESS (harsh: $\beta = -0.002$, 95% *CI* [-0.04, 0.01]; positive: $\beta = 0.0003$, 95% *CI* [-0.01, 0.02]) and FEAR (harsh: $\beta = -0.002$, 95% *CI* [-0.04, 0.01]; positive: $\beta = 0.001$, 95% *CI* [-0.03, 0.03]) in relation to child internalising behaviours included zero, indicating a lack of statistical significance. The direct model (Model 2, see Figure 2), which included harsh and positive parenting as covariates, was found to be significant and retained; child sex did not moderate associations. Results revealed that higher SADNESS traits in fathers were positively associated with child self-reported internalising behaviours ($\beta = 0.20$, 95% CI [0.01, 0.39]). In addition, higher FEAR traits in fathers were negatively associated with child internalising behaviours ($\beta = -0.23$, 95% CI [-0.41, -0.05]).

Results for multiple regressions pertaining to associations between mother and father ANPS personality traits and child behaviour, as well as any significant interactions between parent ANPS and child sex, are presented in Table 4.

Supplementary analyses

Supplementary analyses were conducted to further probe the combined contribution of mothers and fathers as well as to test potential additive and interactive associations among parental ANPS subscales. In the first analyses, all parent subscales were included in the same model to examine the specific contribution of mother and father ANPS traits. When examining

additive associations, significant results remained for mother ANGER and PLAY, however results pertaining to maternal seeking, and paternal SADNESS and FEAR were no longer significant. In a second series of analyses, all interactions between mother and father ANPS subscales were tested to investigate possible buffering or exacerbating associations of affective traits in relation to child behaviour difficulties. No evidence was found for interactions between any maternal and any paternal ANPS scores in the association with child behaviour difficulties in our sample.

Discussion

The primary objectives of this study were to examine associations between parental ANPS personality traits, assessed separately for mothers and fathers, and children's self-reported internalising and externalising behaviours at age seven to eight years; to study whether these pathways were direct or operated indirectly through positive and harsh parenting; and whether associations (direct or indirect) were moderated by child sex.

Maternal affective personality and child behaviour difficulties

The main findings indicated that sons of mothers with higher ANPS ANGER traits reported greater externalising behaviours. Sons of mothers with higher SEEKING traits reported lower externalising behaviours. Finally, mothers with higher ANPS PLAY scores had boys who reported lower scores on internalising behaviours.

Our findings that mothers' ANPS ANGER traits were positively associated with boys' self-reported externalising behaviours are consistent with previous research. Studies have shown maternal anger to be more strongly associated with boys' behaviour difficulties compared to girls' (Renk, Phares & Epps, 1999). In contrast, Orri and colleagues (2018) found that mothers in the high emotional ANPS profile reported greater internalising behaviours in their sons. This

difference may be explained by the fact that our study looked specifically at the ANPS ANGER subscale, rather than considering a combination of ANGER, FEAR and SADNESS as captured by the latent profile analysis. In fact, previous studies have linked maternal negative affect (i.e., elevated sadness and fear) to internalising behaviours (Crawford et al., 2011). Furthermore, in the present study, child behaviour was self-reported (rather than parent-reported).

Although it was expected that mothers with elevated ANPS traits of PLAY would have children with greater externalising behaviours, our findings did not support this hypothesis. Rather, results for maternal PLAY pertained to child-reported internalising behaviours such that mothers with higher scores on PLAY had sons who reported lower scores on internalising behaviours. These findings are in line with previous research that examined the role of maternal playfulness on child internalising behaviours, whereby greater levels of maternal playfulness acted as a protective factor against child internalising behaviours (Shorer, Swissa, Levavi & Swissa, 2019).

Finally, contrary to our initial hypothesis that children of mothers with elevated ANPS SEEKING would report more externalising behaviours, it was found that mothers with higher scores on the ANPS SEEKING subscale had sons who reported lower scores on externalising behaviours. While past research has linked openness to experience with sensation seeking (Zuckerman, 1994), which in turn has been linked to externalising behaviours in children (Frick, Kuper, Silverthorn & Cotter, 1995), our results may be interpreted in light of other aspects of openness to experience (i.e., creativity, inventiveness, perceptiveness) and its relationship to the ANPS SEEKING subscale (Panksepp, 2003). Mothers who have higher scores on openness to experience may thus be more likely to engage in nurturing behaviours (i.e., self-regulation,

emotional expressiveness and encouragement of imaginative problem solving) which are linked to lower externalising behaviours (Metsäpelto & Pulkkinen, 2003).

Paternal affective personality and child behaviour difficulties

Findings for fathers revealed that elevated ANPS SADNESS was linked to greater levels of children's self-reported internalising behaviours. Specifically, neuroticism, which is linked to feelings of sadness, has been found to be related to increased internalising behaviours in children (Kochanska et al., 1997). One mechanism through which paternal sadness could increase child internalising behaviours is through positivity suppression, whereby fathers with elevated levels of sadness are more likely to demonstrate decreased positivity following communications with the child (Jacob & Johnson, 2001).

An interesting and unexpected result pertained to the finding that fathers with higher ANPS FEAR scores had children with lower levels of self-reported internalising behaviours. One possible explanation for this finding could be related to past research linking paternal anxiety with overprotectiveness (Bögels & van Melick, 2004), which has been both negatively (Majdandžić, de Vente, Colonnesi & Bögels, 2018) and positively (Van Der Bruggen, Stams & Bögels, 2008) linked to child internalising behaviours. These inconsistent findings may be explained by the curvilinear association found between parental protectiveness have been linked to increased anxiety in children, whereas moderate levels of paternal anxiety are associated with greater paternal sensitivity and attunement to the needs of their children (Bayer, Sanson & Hemphill, 2006). It can thus be theorised that moderate, rather than low or high, levels of paternal anxiety and protectiveness may be protective against child internalising behaviours. Specifically, moderately anxious and protective fathers are more likely to notice any problems

their child faces and help them to manage difficulties in a healthy manner, which may be associated with decreased child internalising behaviours. Given the use of a community sample in the present study, fathers with elevated levels on the FEAR subscale may be more representative of moderate, rather than clinical levels of anxiety.

Parenting practices, parental affective personality and child behaviour difficulties

Although parenting practices were found to mediate associations between parental personality and child behaviour in past research (Orri et al., 2018; Prinzie et al., 2005b; Prinzie, Stams, Deković, Reijntjes & Belsky, 2009), no indirect pathways of parenting practices, nor conditional indirect pathways (i.e., moderated by child sex), were found in the present study for mothers or fathers. However, in the present study, all key variables were measured concurrently and internalising and externalising behaviours were self-reported by the children. It is possible that such indirect pathways might have been more salient in studies that differed in design (e.g., cross-sectional vs. longitudinal; Trentacosta & Shaw, 2008) and/or type of informants employed for key variables such as parent personality and parenting practices (Mohamed Ali et al., 2021; Keiley et al., 2000; Leve, Kim & Pears, 2005). For example, some studies have found that parenting practices mediated the relationship between parent personality and child behaviour when parents reported on their personality and parenting practices as well as their child's behaviour (Keiley et al., 2000; Leve et al., 2005). In addition, maternal aggressive personality was found to predict boys' self-reported externalising/antisocial behaviour - but within a longitudinal design across several years and with observed parenting as a mediator (Trentacosta & Shaw, 2008).

Finally, it is noteworthy that our results highlighted the moderating role of child sex whereby direct associations between maternal ANPS traits and child behaviour were salient only

boys. This finding may be explained by the differences in maternal socialisation of emotions and behaviours according to child sex (Eisenberg, 2020). For example, mothers may converse more about fear and sadness with girls as compared to boys (Fivush, Brotman, Buckner & Goodman, 2000). The authors further theorised that when discussing family conflicts, mothers report experiencing more anger towards their sons than daughters due to an increased reactivity to boys' externalising behaviours (Fivush et al., 2000).

Strengths, limitations and future perspectives

Key strengths of the study included the large number of participants and the minimisation of shared method variance since parent-reported ANPS subscales were examined in relation to child-reported internalising and externalising behaviours. Including the children's own perspective of their behaviour difficulties adds valuable information. A further strength of this study pertained to the inclusion of data from fathers. In addition, the use of a biologically-, rather than lexically-, based measure of affective personality allowed for a more culturally-consistent conceptualisation of personality (Knežević et al., 2020). We were, however, faced with the following limitations. Firstly, the sample was not randomly selected and there was participant attrition from the initial time point until the present data collection. Participants who remained in the study had a higher socioeconomic level than those representative of Québec families (Côté et al., 2013). Thus, these results may not be applicable to the general population. Furthermore, while much effort was made to recruit as many fathers as possible, they were somewhat less well represented than mothers, as they were often not present at the time of the home evaluation and had lower rates of questionnaire completion. Future work, including a larger number of participants, could further probe potential additive and interactive effects amongst subscales of mother and father affective personality, although our initial analyses did not indicate such

interactive associations. In addition, relying solely on self-reported parenting practices and child behaviour difficulties did not allow for the nuances that multi-informant responses, for each of the constructs evaluated, provide (Mohamed Ali et al., 2021; Dwyer, Nicholson & Battistutta, 2006). Furthermore, future analyses utilising latent class approaches to understand the relationship between child internalising and externalising behaviours could enhance the clinical understanding of the co-occurrence of such difficulties. Finally, the data pertaining to parental personality, parenting and child behaviour difficulties were collected at the same time point, thus precluding the ability to look at true mediation.

Research evaluating parent affective personality and child behaviour difficulties could be used to optimise children's emotional development. For example, findings from our research could help to better identify targets such as parental levels of anger or sadness that could be evaluated in future interventions. Future studies could also examine the relevance of other mechanisms beyond parenting practices that have been previously linked to parental personality and child behaviour difficulties. These include both parent and child temperament (Puff & Renk, 2016), attachment style (Brown & Whiteside, 2008) and child personality (Prinzie et al., 2005a). Certain study designs, such as twin designs, could shed light on the contribution of genetics versus observational learning that could explain such direct pathways.

Conclusion

Child internalising and externalising behaviours have been associated with outcomes such as poorer social relationships, lower academic performance and greater risk for psychopathology. This study demonstrated that certain parental affective personality traits such as mothers' ANGER, SEEKING and PLAY, and fathers' SADNESS and FEAR may be relevant for externalising and internalising behaviours in middle childhood. Findings from this study

allow for a greater understanding of the relationship between biologically based parent affective personality and child behaviour difficulties, which can lead to more tailored, effective intervention strategies that target both children and their parents.

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Table 1

	Mother	Father
Variable	N (%)	N (%)
Child Sex		
Boys	124 (45.6)	97 (46.6)
Girls	148 (54.4)	111 (53.4)
Maternal Education		
High school diploma or lower	15 (5.5)	7 (3.4)
Post high school diploma	99 (36.4)	71 (34.1)
University Diploma	158 (58.1)	130 (62.5)
Annual family income		
Below \$40,000	36 (13.2)	16 (7.7)
Above \$40,000	236 (86.8)	192 (92.3)
Child language of assessment		
English	47 (17.3)	42 (20.2)
French	225 (82.7)	166 (79.8)
Current Marital Status		
Single	38 (14.0)	10 (4.8)
Partnered	234 (86.0)	198 (95.2)

Descriptive Data for relevant participant characteristics

Table 2

Means and standard deviations for parent ANPS scores and child behaviours.

	Mean	(SD)		
Parent Variables	Mother	Father		
ANPS ^a				
ANGER	15.82 (5.89)	15.12 (6.31)		
SADNESS	19.38 (5.65)	16.87 (5.19)		
FEAR	20.15 (7.23)	16.93 (6.85)		
PLAY	25.98 (5.55)	27.20 (5.66)		
SEEKING	27.74 (4.87)	27.55 (4.79)		
CARE	28.70 (4.89)	24.99 (5.39)		
Parenting Practices ^b				
Harsh	2.93 (1.23)	2.58 (1.25)		
Positive	6.33 (1.16)	5.96 (1.19)		
Child Variables				
Self-Reported Behaviour ^c				
Internalising	3.10 (.71)	3.06 (.68)		
Externalising	2.63 (.54)	2.59 (.50)		

Note: All reported means are non-transformed.

^a ANPS subscales range from 0 to 3, with a maximum score of 42.

^b Parenting practices are rescaled from 1 to 10.

^c Child behaviours are rescaled from 1 to 7.

Table 3

Pearson correlations for ANPS subscales, paren	ting practices and child behaviours
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Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maternal ANPS																		
1. ANGER																		
2. SADNESS	0.47**																	
3. FEAR	0.43**	0.68**																
4. PLAY	-0.07	-0.12*	-0.19**															
5. SEEKING	-0.11	-0.17**	-0.22**	0.38**														
6. CARE	-0.08	0.14*	0.07	0.31**	0.22**													
Paternal ANPS																		
7. ANGER	-0.02	-0.05	0.02	0.02	< 0.01	-0.15*												
8. SADNESS	-0.09	-0.03	-0.05	-0.08	0.05	-0.13	0.44**											
9. FEAR	-0.14	-0.09	-0.12	-0.04	0.06	-0.07	0.41**	0.66**										
10. PLAY	0.11	0.10	0.04	0.21**	0.04	0.05	-0.22**	-0.18*	-0.27**									
11. SEEKING	-0.10	-0.03	0.02	0.05	-0.03	-0.07	-0.13	-0.12	-0.08	0.36**								
12. CARE	-0.03	0.03	0.02	< 0.01	0.03	0.18*	-0.14*	0.15*	0.00	0.25**	0.23**							
Maternal Parenting																		
13. Positive	-0.09	0.04	< 0.01	0.19**	0.13*	0.26**	0.07	0.06	0.13	-0.01	0.04	0.10						
14. Harsh	0.38**	0.14*	0.19**	0.04	< 0.01	-0.03	0.05	0.06	-0.04	0.09	-0.17*	< 0.01	-0.15*					
Paternal Parenting																		
15. Positive	< 0.01	0.14*	0.11	0.04	0.05	0.16*	-0.04	0.12	0.05	0.27**	0.22**	0.22**	0.18*	-0.09				
16. Harsh	0.06	0.06	0.07	0.14*	0.02	0.03	0.26**	0.19**	0.20**	-0.07	-0.19**	-0.14*	-0.09	0.32**	-0.07			
Child behaviours																		
17. Externalising	0.21**	0.08	0.08	0.07	-0.07	-0.03	0.06	0.09	0.00	0.16*	-0.10	0.03	-0.06	0.18**	0.01	0.21**		
18. Internalising	0.12	0.08	0.06	-0.03	-0.07	< 0.01	0.07	0.08	-0.06	0.06	0.03	0.07	0.01	0.07	0.01	-0.03	0.34**	

Note. *p \leq 0.05; **p \leq 0.01

Table 4

		Moth		Father					
Child behaviours	Extern	alising	Interr	nalising	Extern	alising	Internalising		
ANPS subscale	b	р	b	р	b p b		b	р	
ANGER	0.27	0.004*	0.08	0.283	-0.01	0.947	0.08	0.287	
SADNESS	0.03	0.761	0.04	0.619	0.14	0.131	0.20	0.041*	
FEAR	0.02	0.847	-0.04	0.670	-0.12	0.167	-0.23	0.012*	
PLAY	0.08	0.214	-0.19	0.046*	0.14	0.074	0.01	0.951	
SEEKING	-0.16	0.062	-0.05	0.422	-0.04	0.538	0.06	0.426	
CARE	-0.01	0.872	0.03	0.675	0.02	0.781	0.05	0.505	
ANPS									
subscale*child sex									
ANGER	-0.24	0.040*	-	-	-	-	-	-	
PLAY	-	-	0.30	0.012*	-	-	-	-	
SEEKING	0.23	0.047*	-	-	-	-	-	-	

Final regressions assessing the link between parent ANPS subscales and child behaviours

Note: *Refers to a significant p value ($p \le 0.05$).

Models were adjusted for relevant covariates (child verbal ability, primary language of the child,

maternal education, family income, single parenthood and parenting practices).

Interaction terms from only final models obtained through backwards stepwise regression were

included.

Boys were coded as 0, girls as1.

Betas are standardized.





Figure 1. Exploratory model testing the associations between parent ANPS, parenting practices, and child behaviour and whether child sex moderated any of the pathways indicated in the figure above. Note that positive and harsh parenting practices were tested separately.





Figure 2. Final model testing the association between parent ANPS affective and child

behaviour, and whether child sex moderated this association.

Note: a_b and a_g were computed by the PROCESS macro from the three parameters implied by the conditional direct path.



Figure 3. Simple slope for the association between child externalising behaviour and mother ANGER by child sex.



Figure 4. Simple slope for the association between child externalising behaviour and mother SEEKING by child sex.



Figure 5. Simple slope for the association between child internalising behaviour and mother PLAY by child sex.