

## SYSTEMATIC REVIEW ARTICLE

# The Interplay between Child Temperament and Parenting Influences on Internalising and Externalising Difficulties of Children: A Systematic Review of the Literature

Natalie Jane Brunsdon<sup>1</sup>, Lucia Sideli<sup>2</sup>, Edith Aguirre<sup>3,\*</sup> and Antonella Trotta<sup>1,4,\*#</sup>

<sup>1</sup>School of Health and Social Care, University of Essex, Wivenhoe Park, Colchester, Essex, C04 3SQ, United Kingdom;

<sup>2</sup>Department of Human Science, LUMSA University, Rome, Italy; <sup>3</sup>Institute for Social and Economic Research, University of Essex, Wivenhoe Park, Colchester, Essex, C04 3SQ, United Kingdom; <sup>4</sup>Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, UK.

**Abstract: Introduction:** Both child temperament and parenting have been investigated as important factors in the development of the psychological and emotional well-being of children. However, their relationship has not been systematically reviewed in early-mid childhood. Therefore, this study aimed to review the interplay between child temperament and parenting influences on childhood internalising and externalising problems.

**Methods:** A systematic search was carried out on psychological and bio-medical databases from inception to July 2023. Only original articles, written in English, assessing the impact of temperament and parenting on childhood internalising and externalising problems before the age of 9 were included.

**Results and Discussion:** Out of an initial pool of 868 records, a total of 190 records were deemed eligible for full-text screening, and 21 studies were included in the narrative synthesis. Of the 16 studies that explored both parent and child influences, all but one found a joint effect of parent and child variables on the outcomes. Multiple studies found evidence for temperament as a moderator in the relationship between parenting and mental health outcomes, but there was also evidence of moderating and mediating effects of parenting on internalising and externalising problems in childhood.

**Conclusion:** The findings of this review highlight that both parenting and child temperament play a role in internalising and externalising difficulties and the importance of considering both contributions of child temperament and parenting behaviours in developmental psychopathology research. However, whilst we can conclude parenting and child factors play a role in these difficulties, deciphering the specific traits and how they interact requires further exploration. Future studies should consider the importance of recruiting nationally representative samples or over sampling from disadvantaged communities and increasing the presence of fathers within the literature on parenting.

**Keywords:** Externalizing, internalizing, young people, parenting, behaviour, personality.

## 1. INTRODUCTION

According to the mental health of children and young people report released in 2023 [1], among 8–16-year-olds, a total of 20.3% had mental health problems. Whilst behaviour and attentional problems remained stable throughout the Covid-19 pandemic, there has been an increase in emotional difficulties over the last few years [2]. A wealth of literature

supports bidirectional influences on child development and behaviour, and it is widely accepted that children are not simply born ‘blank slates’ [3].

The diathesis-stress model poses that some children are more sensitive towards environmental conditions, including the quality of parenting [4]. For example, a review has highlighted that similar parenting behaviours might influence child development outcomes in different ways depending on the characteristics of the child [5]. A recent study also explored both parenting and child temperament as important interacting factors in the development of the psychological and emotional well-being of children [6]. The study showed

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\*Address correspondence to this author at the Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, UK.; E-mail: [atrott@essex.ac.uk](mailto:atrott@essex.ac.uk)  
#These authors contributed equally to this work.

that negative parenting predicted increased the externalising behaviours of children rated by the parents, but only for adolescents with early reactive temperament [6]. However, the lack of rigorous studies in this field limits the generalisability of findings and the understanding of specific mechanisms involved.

Furthermore, children who have persisting high levels of externalising difficulties throughout early childhood and adolescence are at increased risk of poorer outcomes in adulthood, including antisocial behaviour, drug and alcohol misuse, anxiety, and depression [7]. Further support has been found from longitudinal studies that have linked early externalising problems with poorer mental and physical health in adulthood [8].

Ogders *et al.* [9] found that boys and girls who displayed high levels of externalising difficulties throughout childhood were significantly more likely as adults to commit violent acts, have poorer dental health, increased risk of sexually transmitted disease, and poorer economic outcomes, as compared to peers who showed low levels of externalising difficulties or did not display externalising difficulties until adolescence. Similarly, the study by Huesmann *et al.* [10], which spanned over forty years, found that children with high levels of aggression and antisocial behaviour were more likely as adults to have been arrested, experience depression, have poorer physical health and drinking problem as well as lower educational and occupational accomplishments compared to their peers.

Research into the trajectory of internalizing difficulties is less clear than that for externalising difficulties, but there is evidence to suggest internalizing problems do persist across time [11]. Essex *et al.* [12] showed that the presence of internalizing problems at age 6 was predictive of both continued internalizing problems and physical health problems at age 10. High levels of internalizing difficulties in childhood have also been related to poorer health outcomes, overeating in adolescents [13-15] and depressive symptoms in adulthood [16].

Research has consistently found links between childhood temperament (including negative emotionality, shyness, and behavioural inhibition) with internalizing and externalising difficulties [17-25]. However, despite a plethora of research linking child temperament with internalising and externalising problems, these associations are typically within the moderate to modest range, indicating that there are other factors involved in the aetiology of these difficulties [26]. A potential intervening factor is represented by attachment styles. Early experiences with caregivers are crucial in the development of children's capacity to self-regulate their feelings [27]. As infants develop, they move from external sources of regulation to internal ones [28]. Regulation of emotion and arousal is considered a component of temperament [29]; therefore, it is possible to see how the attachment relationship between infant and caregiver may shape the temperament of a child throughout life [30].

Furthermore, there is a wealth of research demonstrating the impact of attachment security on child development outcomes. A review by Ranson and Urichuk [31] found evidence that children with secure attachments demonstrate

improved social-emotional competence during early and middle childhood, greater cognitive ability and academic performance into adolescence, and better physical and mental wellbeing. Research has also highlighted how secure attachments can lead to better psychological and physical health outcomes in adulthood [32, 33]. Vice versa, insecure attachment styles have been shown to predict both externalising symptoms, such as aggression and antisocial behaviours [34], as well as internalizing symptoms, including anxiety, depression, social withdrawal, and somatic symptoms [35, 36].

Therefore, early attachment to caregivers represents an important socioemotional mechanism that plays a role in the association between parenting and child temperamental variables.

However, studies that have explored interactions between parent and child factors have yielded some inconsistencies. Reitz *et al.* [37] found evidence of a significant interaction between adolescents' internalising behaviour and parental strictness and involvement in internalising problems assessed one year later. However, no interaction effect was found for externalising problems. Furthermore, Vitaro *et al.* [19] explored the interaction between harsh parenting and negative emotionality in aggression in toddlers; whilst they found significant effects of parenting and temperament, the interaction model did not reach statistical significance. They also found significant differences between boys and girls on the independent and dependent variables, with boys having significantly higher ratings of aggression, harsh parenting, and negative emotionality scores [19].

In light of these inconsistent findings, the aim of our study was to address the gap within the literature by conducting a systematic review of the interplay between child temperament and parenting influences on children's internalising and externalising problems.

## 2. METHODS

### 2.1. Search Strategy

A systematic search of the literature was conducted on July 17<sup>th</sup>, 2023, using EBSCOhost. EBSCOhost is an online research platform that can search multiple e-journals, ebooks and databases [38]. Databases searched *via* EBSCOhost included APA PsycArticles, APA PsycInfo, APA PsycTests, CINAHL Ultimate, eBook Collection, E-Journals, and MEDLINE Ultimate. Grey literature was not included in the search due to concerns around quality assurance, as unpublished research is not subject to the same rigorous review processes as published work [39]. The protocol for the review was not registered.

For identifying internalising and externalising problems, key terms were "Internalising" "Internalizing", "Externalizing", and "Externalising" which incorporate both American English and British English spellings. For identifying parenting, key terms included "Parenting", "Parent\* attitude", "Parent\* style", "Parent\* Behaviour" and "Parent Practice". Truncation is indicated by the asterisk, such that "Parent\*" will yield results including parenting, parents and parental.

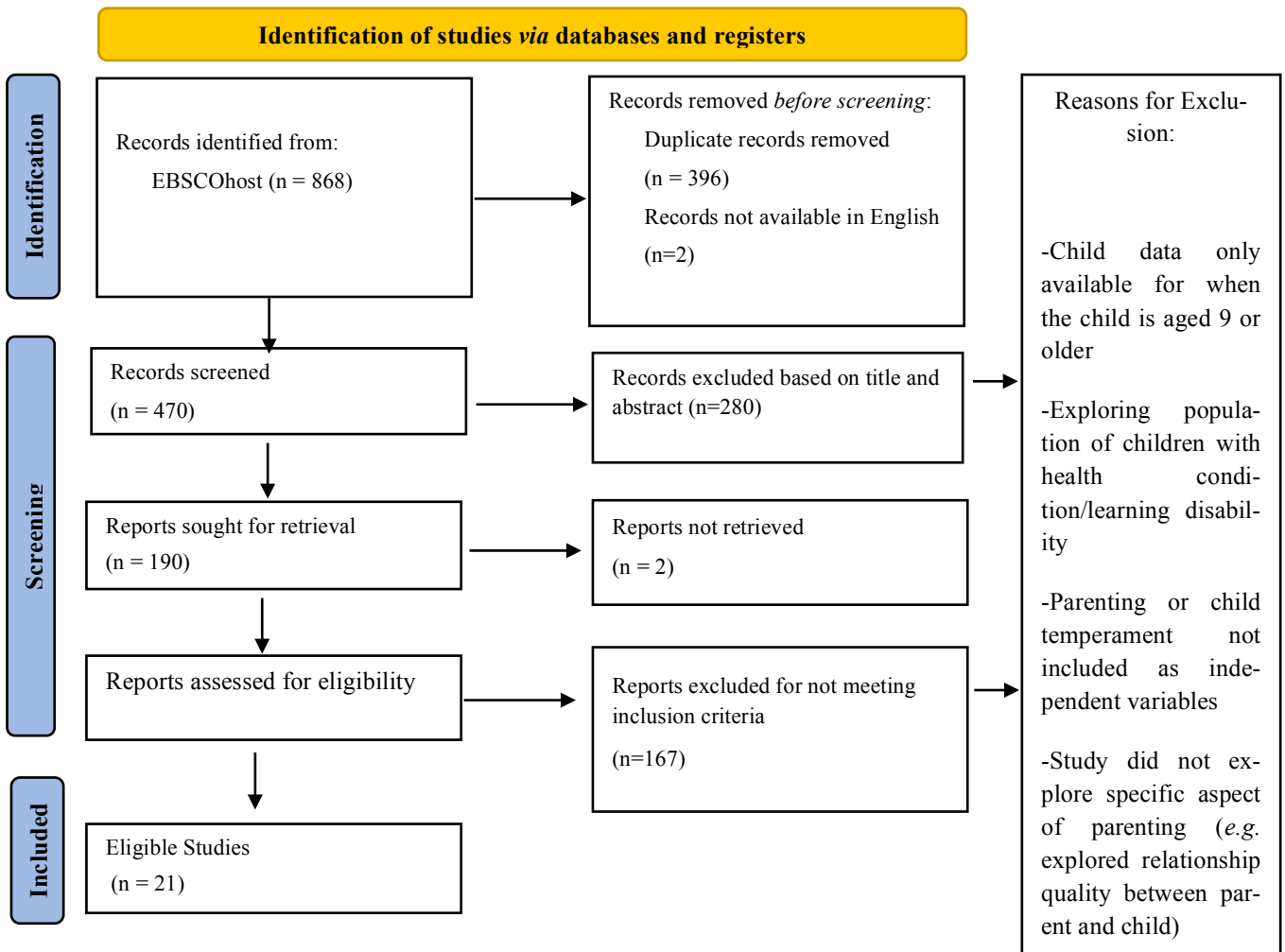


Fig. (1). Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) flow diagram.

Table 1. The search strategy used in EBSCO host.

-	Search Term	Field
-	Temperament OR personality	Title & Abstract
AND	Externalising OR Externalizing OR Internalising OR Internalizing	Title & Abstract
AND	Child OR children OR girl OR boy OR 'young people' OR youth	Title & Abstract
AND	Parenting OR 'Parent* attitude' OR 'Parent* style' OR 'Parent* Behaviour' OR 'Parent Practice'	Title & Abstract

Key terms for children were “Child” “Children”, “Girl”, “Boy”, “Young people”, and “Youth”. For temperament, both “temperament” and “personality” were used as search terms. Full search terms and Boolean operators utilised in the search are provided in Table 1. The search retrieved 868 results. Fig. (1) details the search and screening process.

### 2.2. Screening

Exact duplicates were removed automatically by EBSCOhost, and this resulted in the remaining four hundred

and seventy-two search items. Studies were first screened *via* title and then abstract by the review author. After this, by initial screening, the remaining studies were retrieved to establish if they met the eligibility criteria.

### 2.3. Eligibility Criteria

A summary of the inclusion and exclusion criteria is presented in Table 2. Studies were included if they explored parenting and child temperament influences on the outcomes of internalising and externalising difficulties. Studies were

**Table 2. Summary of inclusion and exclusion criteria for systematic review.**

Inclusion	Exclusion
Child data, including outcomes captured when the child is aged 8 years or younger	Children have a specific health condition or learning disability.
Some assessment or measure of an aspect of parenting, including behaviour, style, practice, attitude, or attribute (e.g., parental warmth)	Study not available in English
Assessment or measure of child personality or temperament	The study explored parent-child relationship e.g., attachment security
Assessment or measure of child internalising problems and externalising problems	Only one outcome was assessed (i.e. only externalising difficulties).
Internalising and externalising problems are assessed as outcome variables, not as independent variables or predictors	Components of internalising or externalising problems assessed with no overall indicator (e.g., only assessing anxiety or aggression)
Parenting and child temperament variables are assessed as independent variables	-

only included if available in English. Further inclusion criteria are described above.

Wachs [40] has suggested that the stage of child development is likely to have an impact on interaction effects between temperament and parenting. He proposes that exploring interactive effects in early childhood may be more effective at revealing possible interactions between temperament and parenting. Adolescence is a period of marked biological, psychological, and social change [41], and both internalising and externalising problems are reported to be highly prevalent during adolescence [42]. There is evidence that the prevalence of internalising difficulties increases during adolescence [43]. Research suggests that behavioural problems associated with externalising difficulties are also attenuated during adolescence [44, 45]. Moffitt [7] proposes that for some individuals, the onset of externalising difficulties begins around adolescence and recommends that to better understand the aetiology and trajectory of externalising problems (particularly anti-social behaviour), exploration of infancy and early childhood is needed.

Furthermore, the expression of difficulties may change in accordance with expected developmental changes across the life course [46]. Reviews exploring parenting and internalising and externalising problems have already been conducted; however, these have predominantly focused on late childhood/preadolescence and adolescence [47, 48]. As research suggests changes in the prevalence and presentation of internalising and externalising difficulties during adolescence and that interaction effects may be more notable at an early developmental stage, it was decided that this review would focus specifically on research conducted in early and middle childhood. Pre-adolescence is generally considered to begin around ages 9-12 [49, 50]. As such, only studies that included children aged 8 years and under were included. Research findings indicate that children with learning disabilities, autism spectrum disorder, or chronic health conditions are more likely to experience psychological problems [51-53]. Consequently, studies were ineligible if they explored populations of children with specific health conditions/illnesses; for example, studies exploring internalising and externalising problems in children with learning disabilities were excluded.

All aspects of parenting were of interest to this review, including parenting behaviour and parenting styles, as well as components of parenting, such as parental sensitivity. Variables that explored parent-child relationship quality (for example, measures of attachment security) were not included as this reflects the nature of the relationship between the parent and child as opposed to specific ways of parenting.

Regarding child temperament, its link with personality is debated, with some authors proposing they are synonymous with each other and can be used interchangeably [54]. Others suggest that, at the very least, temperament represents early emerging personality traits [17]. Regardless, very few argue that there are no links between personality and temperament, and Strelau [54] suggests they are complementary phenomena. For the purpose of this study, temperament has been viewed as akin to the definition proposed by Shiner *et al.* [29] in that it represents individual differences that emerge early on in infant development. These differences may affect self-regulation and neurological processes, such as attention. In this perspective, the underpinning of temperament is considered a complex interplay between environment and biology. Therefore, both temperament and personality were included in the search terms, and no studies were excluded on the basis of how these terms were operationalised.

Studies were only eligible for inclusion if they explored both internalising and externalising difficulties as outcome variables, as both outcomes were relevant to this review. Studies that operationalised internalising or externalising difficulties as consisting of only component parts were not included. For example, anxiety is a component of internalising difficulties, but studies that only assessed for a specific anxiety condition (e.g., Generalised Anxiety Disorder) as opposed to internalising difficulties as a whole would not have met eligibility criteria.

**2.4. Data Extraction and Synthesis**

The Critical Skills Appraisal Programme (CASP) provides checklists that can support critical appraisal of research. Two CASP checklists were used for this review. The cohort study checklist was used for longitudinal studies, and the case-control study checklist was used for cross-sectional

studies [55]. As these checklists are more suited towards healthcare research, some questions were not appropriate for the studies included and were therefore excluded. The results from the checklists are shown in Appendices A and B.

A meta-analysis was not appropriate for this review based on heterogeneity in the conceptualisations of both parenting and child temperament within the included studies. Therefore, the findings of the studies were summarized in a narrative synthesis of the results. To further support a narrative synthesis of the studies, a modified version of a quality appraisal form developed by Radkte [56] was used alongside the CASP checklists. The form was modified to include additional prompt questions for the review author to consider within the quality assessment (Appendix C).

### 3. RESULTS

The search and screening process identified 21 eligible studies for review. The findings from these studies are organized into three areas: 1) the relationship between parenting and internalising and externalising problems (n=20); 2) the relationship between temperament and internalising and externalising problems (n=21); and 3) the interaction between temperament and parenting on internalising and externalising difficulties (n=16). These results are summarized in Table 3.

#### 3.1. Characteristics of the Included Studies

The studies included in the narrative synthesis employed either cross-sectional (n=9) or longitudinal (n=12) designs. The majority of studies (n=14) relied exclusively on parental reports to assess parenting, child temperament (n=17), and internalising and externalising difficulties (n=16). Other assessment methods used included child reports, teacher reports, and observational data.

#### 3.2. Sampling

Details on the sampling methods used in the included studies were often insufficient to determine the exact approach with certainty. Notable exceptions included Acar *et al.* [57], who explicitly stated they used opportunistic sampling, Galitto [58], who reported using stratified cluster probability sampling; and Gulenc *et al.* [59], who indicated that their sample was self-selected from a randomised controlled trial. Nine studies used data from separate research projects, and four studies employed voluntary response sampling methods, either through advertisements or letters. Additionally, four studies used data from national household surveys.

#### 3.3. Participants

All studies included both boys and girls, with gender distribution generally balanced among infants and children. However, Hentges *et al.* [60] did not report child gender in the main text or in the descriptive statistics table.

Eight studies specifically focused on mothers' parenting behaviours. Even among studies that did not exclusively examine maternal parenting, mothers were the primary respondents. For example, Edwards and Hans [61] and Galitto [58] reported that respectively 98% and 93% of respondents

were mothers. Paulussen-Hoogeboom *et al.* [62] also noted that, although the study was not solely focused on maternal parenting, data analysis was conducted using only maternal responses due to the low number of fathers who completed questionnaires (n=5). Three studies explored both paternal and maternal parenting [63-65], while Ren and Zhang [66] specifically focused on paternal parenting, controlling for maternal parenting in their analysis to explore the unique contributions of fathers' parenting practices.

The children's ages across the studies ranged from 5 months to 8 years. The majority of studies (n=9) focused on toddlers (aged 1 to 3 years). Three studies, which focused on children under the age of one, were all longitudinal in design, with outcomes collected once the children reached toddlerhood. Loginova and Slobodskaya [69] included the largest age range (2-7 years) in their cross-sectional study.

A small proportion of studies (n=4) were conducted in Eastern countries (China, Russia, Turkey). Among studies conducted in the USA, Canada, or European countries (n=17) that reported on ethnic diversity, five indicated that the majority of their participants were White. Three studies reported a predominance of Black participants [70, 74-75], while Yu *et al.* [77] specifically focused on Chinese-American children. The study by Edwards and Hans [61] was the only one with a majority Hispanic or Latino sample (52%). Some studies provided limited information on racial and ethnic diversity. For example, Paterson and Sanson [72] noted that their sample reflected the multicultural nature of Australian society but did not offer further details, and sampling was not randomised.

### 4. VARIABLES

#### 4.1. Temperament

The studies by Loginova and Slobodskaya [69] and Zupančič and Podlesek [65] were the only ones to examine personality traits rather than temperament. A total of 22 temperament variables were assessed across the studies, with some overlap in terminology. Difficult temperament and negative emotionality were the most common commonly assessed traits (n=10). Five studies explored negative emotionality, though with variations in terminology, including negative affect or negative reactivity. While Hentges *et al.* [60] and Paulussen-Hoogeboom *et al.* [62] used different terms, they assessed these traits using the same scales. Notably, temperament researchers posit that difficult temperament encompasses elements of negative emotionality and effortful control [78]. Other studies examined specific emotions, such as fear, sadness, or anger, which are commonly associated with negative emotionality [79]. Inhibitory control, delayed gratification, impulsivity, and effortful control were assessed in four studies, and these variables often overlap in the literature [80].

#### 4.2. Parenting

The studies varied considerably in the parenting behaviours and practices explored, with a total of 30 variables assessed across all studies. Only two studies specifically focused on parenting styles [62, 75]. Similar to temperament

**Table 3. Characteristics of studies exploring the role of parenting and temperament in internalising and externalising difficulties - Main findings, study designs, and variables.**

Author(s), Year	Study Design, Country	Sample Size, Age Range (M),	Parenting and its Relationship with Internalising and Externalising Difficulties		Temperament and its Relationship with Internalising and Externalising Difficulties		Interaction Effects of Temperament and Parenting on Internalising and Externalising Difficulties	
			Parenting Variables or Practices	Main Findings (Effect Size, <i>p</i> -value)	Temperament Variables	Main Findings (Effect size, <i>p</i> -value)	Parenting and Temperament Variables	Main Findings (Effect size, <i>p</i> -value)
Acar <i>et al.</i> [57]	Cross-Sectional, Turkey	118 (16-36 months, M = 27.91)	Power Assertive Discipline	A positive association between externalising problems and power assertive discipline ( $r = .25, p \leq .01$ ). No significant associations with internalising problems.	Difficult Temperament	Difficult temperament predicted both internalising problems ( $\beta = 4.51, p \leq .01$ ) and externalising problems ( $\beta = 5.88, p \leq .01$ ).	Power Assertive Discipline Difficult Temperament	Difficult temperament mediated the relationship between power assertive discipline and internalising (indirect effect = 1.09, $p \leq .05$ , CI [0.25, 2.29]) and externalising problems (indirect effect = 1.43, $p \leq .01$ , CI [0.40, 2.69]).
Ato <i>et al.</i> [67]	Cross-Sectional, Spain	474 (6-8 years)	Involvement, Limit Setting	Externalising problems negatively associated with parental involvement ( $r = -.30, p \leq .01$ ) and limit setting ( $r = -.51, p \leq .01$ ). Internalising problems negatively associated with involvement ( $r = -.22, p \leq .01$ ) and limit setting ( $r = -.12, p \leq .05$ ).	Difficult Temperament	Difficult temperament positively related to externalising problems ( $r = .29, p \leq .01$ ) and internalising problems ( $r = .43, p \leq .01$ ).	Involvement, Limit Setting Difficult Temperament	Involvement mediated the relationship between difficult temperament and externalising (indirect effect = 0.212, $p \leq .01$ , CI [0.103, 0.314]). Limit setting mediated the relationship with externalising (indirect effect = 0.782, $p \leq .01$ , CI [0.307, 1.283]) and internalising problems (indirect effect = 0.102, $p \leq .05$ , CI [0.016, 0.201]).
Edwards & Hans [61]	Longitudinal, USA	412 (5 months, M = 5.1 months)	Hostile Parenting	Hostile parenting increased the likelihood of internalising problems (OR = 2.72, $p \leq .01$ , CI [1.12, 6.61]). No significant effect on externalising problems.	Distress to Novelty, Anger / Frustration	Higher distress to novelty increased the likelihood of externalising problems (OR = 1.81, $p \leq .01$ , CI [1.19, 2.76]).	Hostile Parenting Anger / Frustration	Infants with higher levels of hostile parenting and temperamental anger had an increased risk of co-occurring internalising and externalising problems (OR = 1.72, $p \leq .01$ , CI [1.17, 2.54]).

(Table 3) contd...

Author(s), Year	Study Design, COUNTRY	Sample Size, Age Range (M),	Parenting and its Relationship with Internalising and Externalising Difficulties		Temperament and its Relationship with Internalising and Externalising Difficulties		Interaction Effects of Temperament and parenting on Internalising and Externalising Difficulties	
			Parenting Variables or Practices	Main Findings (Effect size, <i>p</i> -value)	Temperament Variables	Main Findings (Effect size, <i>p</i> -value)	Parenting and Temperament Variables	Main Findings (Effect Size, <i>p</i> -value)
Engle & McElwain [63]	Longitudinal, USA	107 (M = 32.7 months)	Punitive & Minimising Reactions	A positive association between internalising problems and maternal punitive reactions ( $r = .29, p \leq .01$ ). Follow-up regression did not find any significant predictors for externalising problems.	Negative Emotionality	Higher negative emotionality predicted both internalising ( $\beta = .57, p \leq .001$ ) and externalising problems ( $\beta = .40, p \leq .001$ ).	Punitive Reactions, Minimising Reactions Negative Emotionality	Maternal punitive reactions were linked to internalising problems in boys with high negative emotionality ( $\beta = 0.27, p \leq .1$ ). Paternal punitive reactions were associated with more internalising problems in boys with high negative emotionality ( $\beta = 0.53, p \leq .001$ ).
Galitto [58]	Longitudinal, Canada	2631 (2-3 years M = 2.57)	Positive, Hostile / Ineffective	Hostile parenting significantly affected both internalising ( $\beta = .25, p \leq .001$ ) and externalising problems ( $\beta = .10, p \leq .001$ ).	Difficult Temperament, Unadaptable Temperament	Difficult temperament predicted externalising problems ( $\beta = .32, p \leq .001$ ) and unadaptable temperament predicted internalising problems ( $\beta = .06, p \leq .05$ ).	Positive, Hostile/Ineffective Parenting Difficult Temperament, Unadaptable Temperament	Difficult temperament moderated the relationship between positive parenting and externalising problems ( $\beta = -0.208, p \leq .001$ ). Unadaptable temperament moderated the relationship between positive parenting and internalising problems ( $\beta = -0.114, p \leq .01$ ).
Gulenc <i>et al.</i> [59]	Cross-sectional, Australia	669 (3 years)	Harsh Discipline, Warmth & Nurturing, Unreasonable Expectations, Overinvolved / Protective	Paternal harsh discipline positively associated with externalising ( $\beta = .20, p \leq .001$ ) and internalising problems ( $\beta = .12, p \leq .001$ ). Overinvolved parenting positively related to internalising problems ( $\beta = 1.76, p \leq .01$ ).	Difficult Temperament	Difficult temperament predicted internalising problems ( $\beta = 2.45, p \leq .01$ ).	NA	NA
Hentges <i>et al.</i> [60]	Longitudinal, Canada	1992 (Birth - 5 years)	Hostile-Reactive Parenting	Hostile-reactive parenting had a direct effect on externalising problems ( $\beta = .12, p \leq .01$ ).	Negative Affect	Negative affect predicted both internalising problems ( $\beta = .32, p \leq .01$ ) and externalising problems ( $\beta = .24, p \leq .01$ ).	NA	NA

(Table 3) contd...

Author(s), Year	Study Design, Country	Sample size, Age range (M),	Parenting and its Relationship with Internalising and Externalising Difficulties		Temperament and its Relationship with Internalising and Externalising difficulties		Interaction Effects of Temperament and Parenting on Internalising and Externalising Difficulties	
			Parenting Variables or Practices	Main findings (Effect size, p-value)	Temperament variables	Main findings (Effect size, p-value)	Parenting and temperament variables	Main findings (Effect size, p-value)
Karreman <i>et al.</i> [64]	Cross-sectional, Netherlands	89 (36 months)	Warmth, Control	No parenting variables were significant predictors in regression analysis.	Anger, Fear, Sadness, Impulsivity	Impulsivity ( $\beta = .60, p \leq .001$ ) and anger ( $\beta = .34, p \leq .01$ ) predicted externalising problems. Fear ( $\beta = .30, p \leq .05$ ) and impulsivity ( $\beta = -.43, p \leq .001$ ) predicted internalising problems.	Warmth, Control Anger, Fear, Sadness, Impulsivity	Paternal positive control moderated the relationship between impulsivity and externalising problems ( $\beta = -0.24, p \leq .05$ ). Parental negative control moderated the relationship between impulsivity and internalising problems for both mothers ( $\beta = 0.32, p \leq .01$ ) and fathers ( $\beta = 0.26, p \leq .01$ ).
Liang et al [68]	Longitudinal, China	84 (6 months, M = 194 days)	Maternal Sensitivity	Regression models found no significant effects of parenting on child behaviour.	Temperamental Withdrawal, Delayed Gratification	Temperamental withdrawal at 6 months predicted internalising problems at 1 year ( $\beta = .48, p \leq .01$ ) and externalising problems at 2 years ( $\beta = -.52, p \leq .01$ ).	Maternal Sensitivity Temperamental Withdrawal	Maternal sensitivity moderated the relationship between temperamental withdrawal and internalising problems ( $\beta = 0.59, p \leq .01$ at low sensitivity; $\beta = 0.42, p \leq .05$ at high sensitivity). No significant interaction was found for externalising problems.
Loginova & Slobodskaya [69]	Cross-Sectional, Russia	370 (2-7 years, M = 5.1)	Positive, Inconsistent, Punitive Parenting, Corporal Punishment	Inconsistent parenting predicted externalising problems ( $\beta = .12, p \leq .01$ ), and corporal punishment predicted externalising problems ( $\beta = .10, p \leq .05$ ). No significant effects on internalising problems.	Disagreeableness, Conscientiousness, Neuroticism, Extraversion, Openness	Disagreeableness ( $\beta = .16, p \leq .01$ ), conscientiousness ( $\beta = .58, p \leq .001$ ), and extraversion ( $\beta = .30, p \leq .001$ ) predicted externalising problems. Neuroticism predicted internalising problems ( $\beta = .40, p \leq .001$ ).	Positive, Inconsistent, Punitive Parenting Disagreeableness, Conscientiousness, Neuroticism, Extraversion, Openness	Positive parenting was a protective factor against externalising and internalising problems in children low in openness (RoS < 29.25 for externalising, RoS < 32.60 for internalising). Punitive parenting was associated with externalising problems in children with low or average conscientiousness.

(Table 3) contd...

Author(s), Year	Study Design, Country	Sample size, Age range (M),	Parenting and its Relationship with Internalising and Externalising Difficulties		Temperament and its Relationship with Internalising and Externalising Difficulties		Interaction Effects of Temperament and Parenting on Internalising and Externalising Difficulties	
			Parenting variables or practices	Main findings (Effect size, p-value)	Temperament variables	Main findings (Effect size, p-value)	Parenting and Temperament Variables	Main Findings (Effect Size, p-value)
Morris <i>et al.</i> [70]	Cross-Sectional, USA	40 (M = 7 years 7 months)	Hostility, Psychological Control	Parental hostility significantly predicted externalising problems ( $\beta = .33, p \leq .05$ ), but only when child temperament interactions were excluded.	Irritable Distress, Effortful Control	Higher effortful control predicted fewer externalising problems ( $\beta = -.34, p \leq .05$ ). Higher irritable distress predicted more internalising problems ( $\beta = .36, p \leq .05$ ).	Hostility, Psychological Control Irritable Distress, Effortful Control	Hostility and irritable distress interacted to predict externalising behaviour ( $\beta = 0.27, p \leq .1$ ). Hostility and effortful control interacted to predict externalising problems ( $\beta = -.039, p \leq .01$ ). Internalising problems were predicted by the interaction of irritable distress and psychological control ( $\beta = 0.34, p \leq .05$ ).
Padilla <i>et al.</i> [71]	Longitudinal, USA	3480 (Birth - 5 years, M = 60.6 months)	NA	NA	Negative Reactivity	Negative reactivity predicted both internalising and externalising difficulties, with a 1 SD increase in negative reactivity linked to a 6% increase in internalising and a 7% increase in externalising scores.	Emotional Support Negative Reactivity	No significant interaction effects of parenting on the associations between temperament and internalising or externalising difficulties.
Paterson & Sanson [72]	Cross-Sectional, Australia	74 (5 - 6 years)	Warmth, Punishment, Explanation, Obedience	No parenting variables were significant predictors for internalising or externalising problems.	Approach, Persistence, Inflexibility	Lower temperamental persistence predicted increased externalising problems ( $\beta = .24, p \leq .05$ ). Lower levels of approach predicted increased internalising problems ( $\beta = .41, p \leq .001$ ).	Warmth, Punishment, Explanation, Obedience Approach, Persistence, Inflexibility	Parental punishment and temperamental inflexibility predicted externalising problems ( $\beta = -1.65, r^2 = 0.27, t = -2.72, p \leq .01$ ). High levels of inflexibility and punishment increased externalising behaviour, while low levels reduced it.
Paulussen-Hoogeboom <i>et al.</i> [62]	Cross-sectional, Holland	196 (3 years, M = 3.4)	Authoritarian, Authoritative	Authoritative parenting negatively predicted both internalising ( $\beta = -.17, p \leq .01$ ) and externalising behaviour ( $\beta = -.17, p \leq .01$ ). No significant effects from authoritarian parenting.	Negative Emotionality	Negative emotionality predicted both externalising behaviour ( $\beta = .44, p \leq .01$ ) and internalising behaviour ( $\beta = .39, p \leq .01$ ).	Authoritative & Authoritarian Parenting Negative Emotionality	The positive association between negative emotionality and externalising problems was partially mediated by authoritative parenting ( $\beta = 0.7, p \leq .05$ ). The positive association with internalising problems was fully mediated by authoritative parenting ( $\beta = 0.07, p \leq .01$ ).

(Table 3) contd...

Author(s), Year	Study Design, Country	Sample Size, Age range (M),	Parenting and its Relationship with Internalising and Externalising Difficulties		Temperament and its Relationship with Internalising and Externalising Difficulties		Interaction Effects of Temperament and Parenting on Internalising and Externalising Difficulties	
			Parenting Variables or Practices	Main Findings (Effect size, <i>p</i> -value)	Temperament variables	Main Findings (EFFECT Size, <i>p</i> -value)	Parenting and Temperament Variables	Main Findings (Effect size, <i>p</i> -value)
Ren & Zhang [66]	Cross-sectional, China	109 (M = 38 months)	Supportive & Aversive	Paternal aversive parenting associated with increased externalising behaviours ( $\beta = .15, p \leq .05$ ).	Persistence, Emotionality	Higher emotionality predicted more internalising ( $\beta = .52, p \leq .001$ ) and externalising problems ( $\beta = .64, p \leq .001$ ). Lower persistence predicted more internalising ( $\beta = -.28, p \leq .01$ ) and externalising problems ( $\beta = -.38, p \leq .001$ ).	Supportive & Aversive Parenting Persistence, Emotionality	Fathers' aversive parenting was associated with externalising problems in children low in persistence ( $\beta = 0.259, p \leq .001$ ) and high in emotionality ( $\beta = 0.206, p \leq .01$ ).
Sirois et al. [73]	Longitudinal, Canada	130 (12 months, M = 12.60)	Maternal Sensitivity, Maternal Autonomy Support	Increased maternal autonomy support reduced increases in both internalising ( $y = -.83, p \leq .01$ ) and externalising problems ( $y = -1.29, p \leq .001$ ).	Activity Level, Social Fear, Anger Proneness	Higher social fear predicted higher initial internalising problems ( $y = 7.13, p \leq .001$ ) and less steep increases over time ( $y = -1.40, p \leq .01$ ). Anger proneness and activity level were associated with higher externalising behaviours ( $y = 15.02, p \leq .001$ and $y = 10.58, p \leq .01$ , respectively).	NA	NA
Sturge-Apple et al. [74]	Longitudinal, USA	201 (M = 26 months)	Maternal Empathy, Maternal Power Assertive Discipline (Moral, Prudential, Conventional)	Conventional power assertive discipline predicted internalising problems ( $\beta = .22, p \leq .05$ ). Moral and prudential power assertive discipline predicted externalising problems ( $\beta = .21, p \leq .05$ and $\beta = -.17, p \leq .1$ , respectively).	Difficult Temperament	Difficult temperament at age 2 predicted both internalising problems ( $r = .31, p \leq .05$ ) and externalising problems ( $r = .44, p \leq .05$ ) two years later.	NA	NA

(Table 3) contd...

Author(s), Year	Study Design, Country	Sample Size, Age range (M),	Parenting and its Relationship with Internalising and Externalising Difficulties		Temperament and its Relationship with Internalising and Externalising Difficulties		Interaction Effects of Temperament and Parenting on Internalising and Externalising Difficulties	
			Parenting variables or practices	Main findings (Effect size, p-value)	Temperament variables	Main findings (Effect size, p-value)	Parenting and temperament variables	Main findings (Effect size, p-value)
Wittig & Rodriguez [75]	Longitudinal, USA	186 (6 months)	Authoritative, Authoritarian, Permissive	Higher maternal permissive parenting predicted increased externalising ( $\beta = .21, p \leq .01$ ) and internalising ( $\beta = .33, p \leq .001$ ) problems. Higher paternal permissive parenting also predicted increased internalising problems ( $\beta = .23, p \leq .001$ ).	Orientating / Regulating Capacity, Negative Affect, Surgency	Higher negative affect predicted higher internalising behaviours ( $\beta = .17, p \leq .01$ ). Lower orientating/regulating capacity predicted higher externalising behaviours ( $\beta = -.17, p \leq .01$ ).	Authoritative, Authoritarian, Permissive Parenting Orientating/Regulating Capacity, Negative Affect, Surgency	Maternal authoritative parenting predicted fewer externalising problems when infant surgency was low ( $\beta = 0.185, p \leq .01$ ). Maternal authoritarian parenting predicted more internalising problems when infant surgency was high ( $\beta = 0.174, p \leq .01$ ). Paternal authoritative parenting predicted fewer internalising problems when infant surgency was high ( $\beta = 1.292, p \leq .01$ ).
Wu & Cui [76]	Longitudinal, USA	1292 (6 months)	Maternal Sensitivity	Path analysis indicated maternal sensitivity negatively associated with both internalising ( $\beta = -.19, p \leq .01$ ) and externalising problems ( $\beta = -.14, p \leq .01$ ).	High Intensity, Normal Temperamental Fear	Weak negative association between normal fear at 6 months and externalising difficulties at 36 months ( $r = -.09, p \leq .01$ ). No main effects of temperament.	Maternal Sensitivity Temperamental Fear	Maternal sensitivity interacted with temperamental fear in predicting internalising problems ( $\beta = -.09, p \leq .01$ ). For externalising problems, no significant interactions were found at different levels of temperamental fear.
Yu <i>et al.</i> [77]	Longitudinal, USA	163 (M = 4.56 years)	Physical Punishment, Guilt Induction	Maternal guilt induction ( $\beta = -.22, p \leq .05$ ) and physical punishment ( $\beta = .19, p \leq .05$ ) had main effects on internalising behaviour. No effects on externalising problems.	Inhibitory Control	Inhibitory control negatively predicted externalising behaviour ( $\beta = -.26, p \leq .05$ ).	Physical Punishment, Guilt Induction Inhibitory Control	Maternal physical punishment and inhibitory control interacted to predict externalising problems ( $\beta = -.017, p \leq .05$ ). The association between physical punishment and externalising behaviour was significant at low levels of inhibitory control ( $\beta = 0.29, p \leq .01$ ), but not at mean or high levels.

(Table 3) contd...

Author(s), Year	Study Design, Country	Sample Size, Age range (M),	Parenting and its Relationship with Internalising and Externalising Difficulties		Temperament and its Relationship with Internalising and Externalising Difficulties		Interaction Effects of Temperament and Parenting on Internalising and Externalising Difficulties	
			Parenting Variables or Practices	Main Findings (Effect size, p-value)	Temperament Variables	Main Findings (Effect Size, p-value)	Parenting and TEMPERAMENT Variables	Main Findings (Effect size, p-value)
Zupančič & Podlessek [65]	Longitudinal, Slovenia	253 (3 years, M = 37.9 months)	Stimulation, Authoritative Parenting, Power Assertion, Ineffective Control	Parenting did not significantly predict internalising or externalising behaviour.	Extraversion, Conscientiousness, Neuroticism, Disagreeableness	High extraversion predicted more internalising problems ( $\beta = .21, p \leq .001$ , teacher rating) and low extraversion predicted more externalising problems ( $\beta = -.32, p \leq .01$ , teacher rating).	NA	NA

Notes: Effect Size ( $\beta$ ): Standardized regression coefficient; r: Pearson’s correlation coefficient; OR: Odds Ratio; p-value: Probability value indicating statistical significance.

Table 4. Key studies - Temperament traits and behavioural outcomes.

Temperament Trait	Behavioural Outcomes		Key Studies
	Internalising (Association)	Externalising (Association)	
Difficult temperament	Positive	Positive	Acar <i>et al.</i> [57], Galitto [58], Ren & Zhang [66]
Negative emotionality/reactivity	Positive	Positive	Engle & McElwain [63], Padilla <i>et al.</i> [71]
Effortful control	-	Negative	Morris <i>et al.</i> [70], Yu <i>et al.</i> [77]
Impulsivity	-	Positive	Karreman <i>et al.</i> [64]
Disagreeableness, conscientiousness, extraversion and neuroticism	Positive (extraversion and neuroticism)	Positive (disagreeableness and extraversion) and negative (conscientiousness)	Zupančič & Podlessek [65], Loginova & Slobodskaya [69]

variables, there were notable conceptual overlaps in the parenting variables. For example, Sirois *et al.* [73] highlighted the shared aspects of maternal autonomy support and maternal sensitivity, with correlation analysis showing a positive association ( $r = .24, p < .001$ ). Furthermore, 12 studies investigated concepts, such as punishment, discipline, punitive parenting, and hostile parenting, which likely share some degree of commonality.

## 5. MAIN FINDINGS

### 5.1. Temperament

All studies that assessed difficult temperament or related traits, such as negative emotionality, found positive associations with both internalising and externalising difficulties. The strength of these associations varied, ranging from weak ( $r = .16$ ) [58] to strong ( $r = .69$ ) [66]. Studies that conducted follow-up analyses also supported the link between difficult temperament and both internalising and externalising problems. For instance, Acar *et al.* [57] found direct effects of difficult temperament on both problem types in their mediation analysis. Longitudinal studies consistently found that

earlier temperamental difficulties predicted later behavioural issues. Engle and McElwain [63] reported that negative emotionality in toddlers predicted more internalising and externalising problems six months later, while Padilla *et al.* [71] found that negative reactivity at age one predicted difficulties at age four.

Two studies [70, 77] reported negative associations between effortful control and externalising problems. Karreman *et al.* [64] examined impulsivity, which has conceptual overlap with effortful control (*e.g.*, lack of effortful control may manifest as impulsivity) [81], and found a positive association between impulsivity and externalising problems in regression analysis.

The two studies that explored personality traits, Zupančič and Podlessek [65] and Loginova and Slobodskaya [69], found disagreeableness, conscientiousness, and extraversion significantly predicted externalising problems. Specifically, disagreeableness and extraversion were positively associated with externalising problems, whereas conscientiousness showed a negative association. For internalising problems, different traits were significant across studies: Zupančič and Podlessek [65] found extraversion to be a significant predictor,

Table 5. Key studies - Parenting behaviour and child outcomes.

Parenting Behaviour	Child Outcomes		Key Studies
	Internalising (Association)	Externalising (Association)	
Hostile parenting	Positive	Positive	Edwards & Hans [61], Hentges <i>et al.</i> [60]
Punishment	Positive	Positive	Yu <i>et al.</i> [77], Loginova & Slobodskaya [69]
Harsh discipline	Positive	Positive	Gulenc <i>et al.</i> [59]
Permissive parenting	Positive (maternal and paternal)	Positive (maternal)	Wittig & Rodriguez [75]
Maternal autonomy support	Negative	Negative	Sirois <i>et al.</i> [73]
Maternal punitive reactions	Positive	-	Engle & McElwain [63]

while Loginova and Slobodskaya [69] found that neuroticism was a significant predictor (Tables 4-5).

5.2. Parenting

In contrast to temperament variables, studies focusing only on parenting reported fewer statistically significant results. For example, Paterson and Sanson [72], Karreman *et al.* [64], and Liang *et al.* [68] found no significant associations between parenting behaviours and child outcomes. Zupančič and Podlesek [65] observed significant associations between parenting variables and child outcomes in correlation analyses, but regression models indicated that parenting did not significantly contribute to the variance in either internalising or externalising difficulties, while child personality traits did contribute.

Notably, these studies were conducted outside of the USA and Canada, where the majority of the research was based. The lack of significant findings in these non-Western studies may reflect cultural differences in parenting practices, or it may be due to the use of measures that were not culturally appropriate. For example, Karreman *et al.* [64] used a translated parenting measure, and Liang *et al.* [68] applied a Canadian-developed scale for maternal sensitivity to Chinese mothers.

Hostile and punitive parenting behaviours were more frequently found to be significantly associated with internalising and externalising problems compared to more positive aspects of parenting. Typically, these negative parenting behaviours were positively correlated with the outcomes, although the associations were not always uniform. For example, Hentges *et al.* [60] found that hostile parenting predicted externalising problems but not internalising problems, while Edwards and Hans [61] found that hostile parenting predicted internalising problems but not externalising problems. Yu *et al.* [77] found that punishment was associated with internalising problems, whereas Loginova and Slobodskaya [69] found that punishment predicted externalising problems. Gulenc *et al.* [59] found that harsh discipline was positively associated with both internalising and externalising difficulties.

The findings for positive parenting practices were less consistent. Galitto [58] found significant results for hostile parenting but not for positive parenting. Similarly, Ren and

Zhang [66] only found associations between aversive parenting and child outcomes, with no significant findings for supportive parenting. However, studies that did find significant results for positive parenting practices generally reported negative associations with child difficulties. For example, Sirois *et al.* [73] found that maternal autonomy support (*i.e.*, developmentally appropriate guidance that fosters agency) was associated with a slower increase in internalising and externalising problems over time.

Contradictory findings were also reported for specific parenting styles. For example, Wittig and Rodriguez [75] found that less authoritative parenting predicted more internalising problems, whereas Paulussen and Hooageboom *et al.* [62] found a direct negative association between authoritative parenting and externalising problems. Zupančič and Podlesek [65] found no significant effect of authoritative parenting on child outcomes.

Studies that examined both maternal and paternal parenting revealed some gender differences. Wittig and Rodriguez [75] found that maternal permissive parenting predicted both internalising and externalising problems, whereas paternal permissive parenting was only associated with internalising problems. Authoritative parenting was a significant predictor of internalising problems, but only for fathers. Engle and McElwain [63] found significant associations between maternal punitive reactions and internalising problems ( $r = .29$ ), but this association did not reach significance for fathers.

5.3. Mediation Effects and Interactions

Sixteen studies explored the interactive and mediating effects of parenting and temperament on internalising and externalising problems. Padilla *et al.* [71] was the only study that did not find evidence of a mediating role of parenting in the relationship between temperament and child outcomes. By contrast, Ato *et al.* [67] found evidence of indirect mediation effects for both internalising and externalising problems. However, they explored different parenting variables (involvement and boundary setting) than Padilla *et al.* [71], who focused on emotional support.

Karreman *et al.* [64] tested both moderation and mediation models but found only evidence of a moderating effect of parental control. Moderating effects were also identified by Liang *et al.* [68], although only for internalising problems.

**Table 6. Key studies - Interaction effects of parenting and child temperament.**

Parenting Behaviour	Temperament Trait	Interaction Effect	Behavioural Outcome	Key Studies
Involvement, Boundary Setting	Temperament	Indirect mediation effects	Internalising & externalising problems	Ato <i>et al.</i> [67]
Parental control	Impulsivity	Moderating effect	Internalising & externalising problems	Karreman <i>et al.</i> [64]
Power-assertive Discipline	Difficult Temperament	Mediating effect	Internalising & externalising problems	Acar <i>et al.</i> [57]
Positive Parenting	Difficult / Unadaptable Temperament	Moderating effect	Internalising & externalising problems	Galitto [58]
Aversive Parenting	Low Persistence / High Emotionality	Moderating effect	Externalising problems	Ren & Zhang [66]

Interestingly, the interaction between temperament and parenting assessed at 6 months predicted internalising problems, but this interaction was no longer significant when assessed a year and a half later.

Some studies suggested that temperament may mediate the relationship between parenting and child outcomes. Acar *et al.* [57] found that difficult temperament mediated the relationship between power-assertive discipline and both internalising and externalising problems. Specifically, higher levels of power-assertive discipline were associated with children who had more difficult temperaments, which, in turn, predicted higher levels of both problem behaviours.

The majority of studies, however, explored temperament as a moderator of the relationship between parenting and child difficulties. Galitto [58] found that a difficult temperament moderated the relationship between positive parenting and externalising problems, while an unadaptable temperament moderated the relationship between positive parenting and internalising problems. Other studies found moderating effects only at extreme levels of temperament traits. For instance, Ren and Zhang [66] found that aversive parenting was associated with increased externalising problems only in children who were low in persistence or high in emotionality. Similarly, Engle and McElwain [63] found that both maternal and paternal punitive reactions were linked to increased internalising behaviour only in boys with high emotionality (Table 6).

## 6. QUALITY ASSESSMENT

In general, longitudinal studies were considered to have stronger designs due to their ability to track changes over time. However, some studies raised concerns about the length of time between measurements. For instance, Yu *et al.* [77] had only three months between time points, which may not have allowed enough time for developmental changes in difficulties to emerge. Although Liang *et al.* [68] used a longitudinal design, one of their temperament measures was collected simultaneously with the dependent variables, thus preventing inferences about causality.

On balance, the quality of the studies was generally similar, with two notable exceptions. Paterson and Sanson [72]

and Morris *et al.* [70] had somewhat weaker methodologies. Both were cross-sectional with small sample sizes (74 and 40, respectively). Morris *et al.* [70] did not provide details on their recruitment methodology, and Paterson and Sanson [72] had a biased sample of children attending Catholic schools recruited through a previous study. Furthermore, Paterson and Sanson did not use a validated measure of parenting, relying instead on an adapted version without detailing the nature of these adaptations. Although Morris *et al.* [70] used child reports of parenting, which is a strength, their measure of internalising and externalising difficulties was a modified version with no information on its validity or modifications. It is important to note that these two studies were among the earliest in this research area.

### 6.1. Sample size and Statistical Analysis

Sample sizes were generally deemed adequate for the statistical analyses conducted. However, there were a few studies where the sample size raised concerns about statistical power. Morris *et al.* [70] had the smallest sample, with only 40 participants. For regression analysis, some recommend a minimum of ten observations per independent variable [82]. Given that Morris *et al.* [70] included three independent variables and two interaction terms in their regression model, a larger sample size may have been beneficial, particularly as one of their results approached significance. Similarly, Karreman *et al.* [64] had only 89 participants, and despite conducting separate analyses for gender and parenting variables, some of their hypothesised interactions were not significant. A retrospective power analysis could have clarified whether the sample size was sufficient. Likewise, Engle and McElwain [63] and Ren and Zhang [66], with sample sizes of 107 and 109 participants, respectively, reported results approaching significance. Padilla *et al.* [71], despite a larger sample size ( $n=3480$ ), acknowledged that the presence of multiple subgroups with smaller sample sizes for each subgroup might have reduced the power to detect some associations. However, they did not conduct a power analysis to confirm this. Acar *et al.* [57] was the only study to acknowledge that certain mediation analyses were not performed due to sample size limitations. This study also conducted a retrospective power analysis, reporting a statistical

power was 0.83, which is above the generally accepted threshold of 0.8 [83].

## 7. MEASURES

### 7.1. Child Temperament

All but one study assessed child temperament using questionnaires. Two studies used both questionnaires and observation [61, 68], where observations were used to assess traits not measured by questionnaires rather than to complement parent reports. Wu and Cui [76] was the only study to use observation alone to assess temperament, conducting it within participants' homes and reporting an inter-rater reliability of over 80%. Most studies relied on mothers' reports, with Zupančič and Podlesek [65] being the exception, incorporating reports from mothers, fathers, and teachers. The Child Behaviour Questionnaire [CBQ]; [84] was the most widely used measure (n=7), followed by the Toddler Behaviour Assessment Questionnaire [TBAQ]; [85], the Infant Behaviour Questionnaire [IBQ]; [78], and the Inventory of Child Individual Differences [ICID]; [86], each used by two studies. Only two studies did not use previously validated measures [59; 71]. All studies using multi-item measures of temperament reported Cronbach's alpha values within acceptable ranges (0.60-0.9) [87], though Liang *et al.* [68] reported an alpha of 0.57. The authors acknowledged this, explaining that at the time of their study, their measure was the only one with Chinese norms and copyright.

### 7.2. Parenting

Most studies (n=14) assessed parenting using self-report measures, while six studies included observational data. Morris *et al.* [70] was the only study to use child self-report. Four studies incorporated reports from both parents: two averaged the scores and two analysed them separately for mothers and fathers. Among the studies that used observation, Padilla *et al.* [71] and Edwards and Hans [61] did not report any inter-rater reliability. The remaining four studies reported substantial or perfect inter-rater agreement, according to Landis and Koch [88]. All observational studies were conducted within the home environment.

The self-report measures varied greatly across studies, with no single measure being used more than once. Some concerns were raised about the appropriateness of certain measures. For example, Loginova and Slobodskaya [69] used the Alabama Parenting Questionnaire-Preschool Revision [APQ-PR; 89], designed specifically for pre-school-aged children, but their sample included children up to age 7. Additionally, one subscale had a low internal consistency ( $\alpha=0.48$ ). Several studies used subscales or individual items from multiple measures, making it difficult to determine the origin of some items. For instance, Galitto [58] did not specify the sources of items for their measure. Paulussen-Hoogbeem *et al.* [62] and Paterson and Sanson [72] used various items from different parenting measures and then performed principal component or factor analysis. Sturge-Apple *et al.* [74] administered self-report measures in a laboratory setting, which may have introduced social desirability bias, particularly in response to parenting questions,

where participants might be concerned about negative evaluation.

### 7.3. Internalising and Externalising Problems

All studies assessed internalising and externalising difficulties using questionnaires. The Child Behaviour Checklist [CBCL]; [90] was the most frequently used measure (n=9), followed by the Strengths and Difficulties Questionnaire [SDQ]; [91] (n=4). Concerns about validity and reliability were less common for these outcome measures, as all studies used full, validated measures with sound psychometric properties. Paterson and Sanson [72] and Karreman *et al.* [64] were the only studies to include reports from both parents and teachers, while most studies used mother-only reports (n=9). Four studies used aggregated scores from both parents, three studies included teacher reports, and two studies used primary caregiver reports, which were usually from mothers.

### 7.4. Bias

The risk of bias and financial conflicts of interest was generally low across the included studies, as none reported on medications or therapeutic interventions. The exception was Gulenc *et al.* [59], who used data from a randomised controlled trial facilitated by some of the same authors, raising potential concerns about bias in data handling and interpretation. Several studies exhibited bias in socioeconomic status and education level, with ten studies reporting predominantly middle-class or well-educated participants compared to the general population. However, four studies reported efforts to increase diversity in their samples by oversampling from certain demographic groups (*e.g.*, low-income, lower education, or minority racial groups). For example, Wittig and Rodriguez [75] oversampled participants with socio-demographic risk factors, requiring mothers to meet one of the following criteria: receiving government aid, living below the poverty line, having a high school education or less, or being aged 18 or under.

The findings from the included studies offer a nuanced understanding of the complex interactions between parenting practices, child temperament, and their combined effects on internalising and externalising problems in children.

Hostile and punitive parenting practices were consistently linked to both types of behavioural issues. Hostile-reactive parenting, for example, was associated with externalising problems across several studies, while punitive parenting showed a stronger connection to internalising difficulties, particularly among boys with high emotional reactivity. In contrast, positive parenting practices exhibited more variable results, with significant effects emerging mainly in studies with larger sample sizes or more rigorous designs. These inconsistencies may reflect cultural differences in parenting styles or variations in study methodology, such as a reliance on maternal reports.

Temperament, particularly difficult temperament and negative emotionality, emerged as strong predictors of both internalising and externalising problems across nearly all studies. These traits were especially influential in longitudinal studies, where early temperamental difficulties predicted

later behavioural challenges. Other temperament traits, such as effortful control and impulsivity, also showed specific patterns. Higher effortful control was associated with fewer externalising behaviours, while greater impulsivity heightened the risk for such outcomes. These findings suggest that certain temperamental traits can play a critical role in the development of behavioural issues, regardless of parenting style.

Moreover, the interaction between parenting and temperament was a key focus in several studies. In particular, children with a difficult temperament were more likely to exhibit internalising and externalising problems in response to punitive parenting. On the other hand, positive parenting practices seemed to be more effective in mitigating behavioural difficulties for children with less challenging temperaments. This highlights the importance of considering both individual child characteristics and parenting behaviours when understanding their combined influence on child development.

While the overall patterns across studies were consistent, some important variations emerged. For example, studies conducted in non-Western contexts tended to report fewer significant associations, which may be due to cultural differences in parenting norms or the use of measurement tools developed primarily for Western populations. Methodological differences also played a role, with longitudinal studies generally providing stronger insights into the temporal development of behavioural outcomes. However, some faced challenges related to timing and small sample sizes. Cross-sectional studies, while valuable for capturing immediate associations, were limited in their ability to examine long-term trends or the directionality of relationships.

These findings underscore the complex and dynamic relationships between parenting, temperament, and child behavioural outcomes. Future research should prioritise culturally sensitive measures and longitudinal designs to capture developmental trajectories more effectively. The insights gained from all the studies analysed can inform interventions aimed at reducing the adverse effects of hostile parenting and promoting positive parenting strategies, particularly for children with challenging temperaments.

## 8. DISCUSSION

### 8.1. Main Findings

Consistent with theoretical perspectives that highlight the reciprocal nature of parental and child influences on child development outcomes [5, 92], the results of this review indicate that both parenting and child temperament play a role in internalising and externalising difficulties.

Of note is that of the sixteen studies that explored the interactive or mediating role of both parent and child influences, all but one found a joint effect of parent and child variables on the outcomes. This highlights the importance of research that explores these difficulties to consider both the contributions of parents and children. There were some inconsistencies in how these patterns emerged, and multiple studies found evidence for temperament as a moderator in the relationship between parenting and the outcomes [58, 63, 66, 70, 75, 77]. However, there was also evidence of moder-

ating and mediating effects of parenting [62, 64, 67, 68-69]. This indicates that whilst we can conclude that parenting and child factors play a role in these difficulties, deciphering the specific traits and how they interact requires further exploration. The results also indicate the importance of post hoc tests, such as simple slopes or regions of significance, in better understanding the interactions. For several studies, interaction effects were only found at particularly high or low levels of temperament or parenting traits.

### 8.2. Methodological Quality

The methodological quality of the papers included within the review was generally deemed to be similar across studies with some limitations that were noted across multiple studies. Several studies did not provide sufficient details regarding sampling methods; therefore, it was unclear if the studies could be generalised to the wider population. Similarly, the majority of studies appeared to have samples that were predominately well-educated and white and representation of families from lower socioeconomic backgrounds appeared to be missing.

Further, it was not possible to establish if there were different effects of parenting and temperament on the outcomes across different cultural contexts within this review. This was due to the fact the majority of studies came from the USA or Canada, and explorations of this topic were limited to other countries. Further, there was such homogeneity in the variables explored that direct comparison across countries was not feasible. A common critique of research is a bias toward samples being recruited from Western, Educated, Industrialized, Rich, and Democratic (WEIRD) populations [94]. An ethnocentric perspective might bias the study of the relationship between parenting and children's outcomes, and cultural differences should be taken into account in understanding the interconnected processes between biology and environmental experiences [95].

Furthermore, cultural variations extend beyond nationality or ethnicity, affecting social class, parental education, income, employment status, and religion, which have bidirectional influences on psychological processes [83, 93, 96-97] and have been linked to child development outcomes [98-99]. Finally, parenting may also be particularly sensitive to changes across time. For example, Gardner *et al.* [100] hypothesise that changes to parental monitoring and expectations in the last three decades reflect adaptations to changes in societal changes to family context and structure.

The majority of studies used self-report measures for both parent and child variables. Common criticisms of self-report measures are that they can be subject to several biases, including perceptual, social desirability, and recall bias [101]. In particular, social desirability bias may attenuate self-report parenting behaviours, where participants may fear negative evaluation. Observational methods to assess parenting are often hailed as the best, with arguments that they offer more objectivity [101]. However, observational methods are also subject to bias, such as the Hawthorne effect [102]. In addition, they typically only cover a snapshot of a particular time period or context, so they may lack generalisability across time and context. Coding of behaviours and

interactions is also still open to subjectivity, further observational methods can be costly and time-consuming to complete [103]. Given both observational and self-report measures are subject to different biases, they may impact study findings in different ways and direct comparison between the different methodologies may not be appropriate. Further, Zahidi *et al.* [101] argue that self-reports and observational methods may capture discrete constructs and, therefore, self-report measures should not be viewed as substitutable for observational methods.

The majority of studies used parent-rated questionnaires to assess temperament, and all studies used parents-rated questionnaires for the assessment of internalising and externalising problems. The use of parent-rated over self-rated measures might have introduced potential observation bias. However, the study measures were mostly psychometrically robust, widely used questionnaires, such as the Child Behaviour Questionnaire [CBQ; 79] for temperament and the Child Behaviour Checklist [CBCL; 90] for internalizing and externalizing symptoms. Furthermore, the use of parent-rated measures might depend on the inclusion of preschool children and the lack of applicability of self-report measures to this population.

In addition, the majority of questionnaires were completed by mothers. Reassuringly, there is evidence that the reports of mothers and fathers on measures of temperament demonstrate considerable agreement [104]. However, for internalising and externalising measures, the evidence of parental agreement is mixed, with some reporting good agreement [105]. A meta-analysis by Duhig *et al.* [106] found a strong agreement for externalising problems but only moderate agreement for internalising difficulties. This indicates that gathering converging reports of children's internalising and externalising difficulties may be of benefit, particularly due to discrepancies in reports for internalising problems.

Reviews of parenting literature between 1984 and 2015 have consistently found an absence of fathers within the literature [107-109]. Further, there is evidence that mothers and fathers differ in how they parent [110]. A meta-analytic review by Jeynes [111] found significant unique contributions to fathers' parenting, and this contribution had the same effect across boys and girls. It was also found that fathers' parenting was associated with measures assessing psychological wellbeing and academic achievement; of note is the finding that fathers' involvement reduced children's rates of delinquency and substance misuse. There was also evidence of differences in how fathers treat their daughters compared to their sons.

Another potential bias is the paucity of cross-culturally validated measures for the assessment of temperament [62]. Translated measures, even those that are back-translated, pose a risk of measurement invariance as the underlying construct for the item may have different meanings across cultures, or translation has not accurately captured cultural nuances around how language is interpreted [112]. For instance, Cheung and Cheung [113] highlight how many personality measures used within Asian countries are 'imported' from Western societies, suggesting that culturally specific

personality traits may not be captured by them as they are based on Western norms. A review by Dong and Dumas [114] highlighted that a lack of measurement invariance within personality measures studied cross-culturally may lead to inaccurate conclusions.

Finally, the findings of this study should be interpreted as accounting for the role of potential confounders, which might affect the relationship between childhood temperament, parenting behaviours, and externalizing and internalizing symptoms, such as shared biological risk factors between children and parents (*e.g.*, parental temperament, parental mental disorders) and broad environmental risk factors (*e.g.*, low socioeconomic status, minority stress). In fact, only a few studies assessed the role of potential confounders, and some of them focused just on children's gender and age (see Supplementary materials, Appendix A).

### 8.3. Explanatory Mechanisms

The finding of this systematic review consistently showed that temperament traits that encapsulated higher propensities for distress, such as difficult or negative affect, were associated with more internalising and externalising difficulties. However, nearly all studies explored higher-order dimensions of temperament (*e.g.*, negative affect), whereas specific traits (*e.g.*, anger) were rarely explored. Investigating the interplay between specific temperament traits and parenting styles might contribute to a deeper understanding of risk and protective factors for childhood psychopathology.

Moreover, few studies explored more positive aspects of temperament, such as effortful control, which was linked to less externalising problems [70]. Effortful control is thought to reflect aspects of executive functions, and Zhou *et al.* [115] have argued that they actually reflect the same construct, but different fields of research (temperament versus neuroscience) have resulted in a differentiation between the two concepts and propose a unitary model of self-regulation. A meta-analysis by Yang *et al.* [116] found longitudinal associations between executive function and externalising and internalising problems, with greater executive function predicting fewer problems. Integrating developmental psychopathology towards with the neuroscience approach might provide more robust evidence of the relationship between temperament, parenting, and psychopathology.

The relationship between temperament, parenting, and psychopathology might be considered the results of multiple developmental pathways, thus explaining the heterogeneity of the findings. The moderating effect of early temperament on the relationship between parenting style and psychopathology [58, 63, 66, 70, 75, 77] might be understood in light of the diathesis-stress model, which posits that children's innate characteristics were more at risk of mental health problems and poor adjustment, particularly if exposed to a negative family environment [117]. The subsequent differential susceptibility hypothesis proposed that children's vulnerability should be better defined as sensitivity or plasticity to both the negative and the positive influences of the rearing environment [118].

In light of these models, a large body of study has investigated the moderating effect of children's negative affectivity or difficult temperament [119], whereas more recent research has shifted attention to positive temperamental traits, such as effortful control or emotion regulation [120]. Furthermore, literature has shown that children's sensitivity to parenting may have a (poly)genetic basis [121]. Genetic polymorphisms involved in the regulation of dopamine (DAT1, DRD2, DRD4), serotonin (5HTTLPR), and the degradation of specific enzymes (MAOA) might, in fact, modulate the effects of both adverse and enriched environments on children's development [122-124]. However, the study of gene-environment interaction [125] should account for the possibility that children's temperament and parenting styles are not independent, *i.e.*, gene – environment correlation (rGE). Children's temperament and parental behaviour might be an expression of a shared genetic liability (defined as passive rGE), or specific traits might favour some parental responses (defined as evocative rGE) [126].

We also found evidence of moderating and mediating effects of parenting [62, 64, 67, 68-69]. Research has shown that harsh parenting tends to favour children overarousal, which may impair emotion regulation processes underlying externalizing symptoms [127]. Furthermore, attachment security has been consistently viewed as a moderator of the relationship between childhood temperament and childhood symptoms [128-130] by providing the child with effective strategies to manage negative affect and stress [28, 131] and supporting the development of mentalization abilities [132, 133].

#### 8.4. Limitations

There are some limitations of this review. Ascertaining further details surrounding sampling and clarifying the measures used in studies that reported using modified measures could have been established *via* contact with the study authors. A further limitation is that data extraction and quality appraisal were only conducted by the first author; a more rigorous process would have been to have two individuals responsible for data extraction, appraisal, and synthesis. Furthermore, due to the heterogeneity of the study exposures and their measures, a quantitative synthesis could not be conducted, and data were summarised only *via* narrative synthesis. Finally, the exclusion of grey unpublished literature might have limited the findings of the review, excluding some preliminary results (*i.e.*, those presented in conference proceedings, dissertations, or articles in non-indexed journals). Nevertheless, this choice might increase the quality of the included studies through the peer review process.

A strength of this review is that it represents one of the first known attempts to synthesise the data on parenting and child contributions to internalising and externalising problems in early childhood. It also indicates areas that would benefit from further exploration in future research.

#### CONCLUSION

The results of this review highlight the complex interplay between temperament and parenting on internalising and externalising problems. Several areas of further exploration

have been identified through this review. A surprising finding was that no study could be found utilising a sample from the UK. There was generally a paucity of research exploring this topic cross-culturally within other European countries and Asia, with the exception of China. A need to explore, validate, and develop culturally sensitive measures of parenting, in particular, was identified. Furthermore, as highlighted by another recent systematic review, there is a paucity of studies involving non-white and socially disadvantaged participants [8, 134]. Given the relevant influence that cultural and social contexts, minority status, and social disadvantage can exert on parental behaviours [135], future studies should consider the importance of recruiting nationally representative samples or over-sampling from disadvantaged communities.

Future research should also endeavour to increase the presence of fathers within the literature on parenting. An additional recommendation is to capture comparisons across parent and child gender as unique interactions may be found.

There has been more focus within the literature on the impact of negative temperament traits on the risk of internalising and externalising problems. It would be of interest to future researchers to consider the impact of more positive attributes of temperament and parenting on internalising and externalising problems. These include children's effortful control, emotion regulation, and self-agency, as well as parental attachment security, warmth, and expression of positive emotions, mentalization, and affective attunement.

Literature suggests the importance of identifying parental behaviours that might better contribute to preventing internalising or externalizing symptoms among children with a particular temperament. For instance, there is an indication that interventions for highly inhibited children should be addressed with parental control, whereas interventions for highly disinhibited children should focus on parental discipline and warmth [136]. In this view, micro-trial experimental studies may provide a valuable evidence base to high-light targets of future early intervention programmes [136].

#### Clinical Implications

Research indicates that early intervention and prevention strategies for mental health are less economically intensive, and there is evidence that parenting interventions, possibly taking into account childhood temperament, are efficacious in preventing and treating early internalizing [137, 138] and externalizing problems [6, 121, 139]. In addition, parental interventions for early psychopathological symptoms might have relevant positive effects on the mental health of caregivers [140].

There is increasing evidence that parenting interventions that focus on supporting children to develop their emotion regulation may be of benefit in the prevention of both internalising and externalising difficulties [141]. For instance, the Solihull approach to parenting is built on the premise that in order for parents to offer containment (of feelings that are unmanageable to a child), the parent must be first supported to contain their own feelings and anxieties. This approach might allow parents to think more clearly about what their child's behaviour may communicate and attune more effec-

tively to them [142]. Evidence has been found that this approach can be helpful for improving child behaviour outcomes, promoting prosocial behaviour in children, reducing parent and child anxiety, and improving parent-child relationships [142]. Similarly, there is evidence for other approaches that encourage the development of self-regulation through parenting intervention [143]. Recommended interventions for children's mental health problems include individual and group therapies, such as CBT, as well as systemic approaches, such as functional family therapy [144]. Whilst there is evidence for the efficacy of these methods [144], interventions that focus on increasing the capacities of parents to support their child's self-regulation may be a more amenable and cost-effective target for preventative measures [143].

Additionally, policymakers need to invest in funding a variety of evidence-based interventions for parents/caregivers at the population level that combine both universal approaches and interventions targeted to specific needs. Policies should also address funding barriers so that parents/caregivers can access them, and they should also ensure to fund research that examines what works for whom and in what context [145].

#### AUTHORS' CONTRIBUTIONS

It is hereby acknowledged that all authors have accepted responsibility for the manuscript's content and consented to its submission. They have meticulously reviewed all results and unanimously approved the final version of the manuscript.

#### LIST OF ABBREVIATIONS

APQ-PR =	Alabama Parenting Questionnaire-Preschool Revision
CASP =	Critical Skills Appraisal Programme
CBCL =	Child Behaviour Checklist
CBQ =	Child Behaviour Questionnaire
TBAQ =	Toddler Behaviour Assessment Questionnaire
WEIRD =	Western, Educated, Industrialized, Rich, and Democratic

#### CONSENT FOR PUBLICATION

Not applicable.

#### AVAILABILITY OF DATA

All the data and supportive information are provided within the article.

#### STANDARD OF REPORTING

PRISMA guidelines and methodology were followed.

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#### CONFLICT OF INTEREST

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#### SUPPLEMENTARY MATERIAL

PRISMA checklist is available as supplementary material on the publisher's website along with the published article.

Supplementary material is available on the publisher's website along with the published article.

#### DISCLOSURE

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