THE IMPACT OF MOOD ON CHILDREN'S EGOCENTRISM

by

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A thesis submitted to the University of Birmingham for the degree of

DOCTOR OF CLINICAL PSYCHOLOGY

Centre for Applied Psychology

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The University of Birmingham

May 2024

Thesis Overview

This thesis is submitted for the degree of Clinical Psychology Doctorate at the University of Birmingham, containing three chapters. The first chapter presents a meta-analytic review of the literature on the impact of callous-unemotional (CU) traits on depression and anxiety symptoms in young people with conduct disorder. An analysis of 18 studies found that overall CU traits did not predict anxiety and depression. The second chapter presents an empirical study of the effect of mood on egocentrism in children aged six and seven. The study involved inducing either a happy or neutral mood in the participants and measuring their mood before and after mood manipulation. Self-reported mood scores indicate that a happier mood state predicts an increased egocentric bias in children. The third chapter includes corresponding press releases for chapters one and two.

Acknowledgements

My deepest gratitude goes to my research supervisor, Dr. Andrew Surtees, whose invaluable knowledge, time, and unwavering enthusiasm for research has been inspiring. I am also thankful to Dr. Christopher Jones for his guidance in helping me navigate the world of statistics.

I am also grateful to all the students who participated and the school teachers who supported my data collection.

I would like to thank my amazing parents for sending me delicious food, to Parmis for answering my daily calls, and friends, who have been a source of love and all things fun. Thank you for listening to me and bringing joy back into my life when things got tough.

Finally, I want to thank my partner, Wez, for his patience, love, and humour throughout this journey.

Table of Contents

List of Figures

List of Tables

Chapter 1: Literature Review: A Meta-Analysis on Anxiety and Depression in Young People with Conduct Disorder and Callous-Unemotional Traits

Abstract

Introduction: Conduct disorder (CD) in young people has been associated with internalising symptoms, including anxiety and depression. Young people with CD and callous-unemotional (CU) traits form a subgroup that shows more severe and enduring externalising behaviours.

Method: Two separate meta-analyses were conducted, encompassing group-based differences between high and low CU traits and correlational outcomes. The first meta-analysis included 18 studies of children with CD or conduct problems examining standardised mean differences between those with high and low CU in, anxiety (nine studies), depression (seven studies) and combined anxiety and depression (seven studies). The second, correlational, meta-analysis included three studies. The methods used to derive these estimates were assessed for their risk of bias.

Results: A random effects model of standardised mean differences revealed no statistically significant difference in internalising symptoms between those with high and low CU traits. Similarly, no significant differences were observed in the separate outcomes of anxiety, depression, or combined anxiety and depression. In community samples, high CU traits had a small but significant positive relationship withinternalising symptoms. A fixed-effects model was used to analyse the correlation data, which showed no significant relationship between CU traits and anxiety or combined anxiety and depression.

Discussion: The presence of high CU traits did not predict internalising symptoms in young people with CD. The possibility of a non-linear effect is discussed. Findings suggest that young people with CU traits may need targeted interventions regardless of whether they present with high or low CU traits.

Introduction

Conduct disorder (CD) is diagnosed in children up to the age of 18 who show a persistent pattern of behaviour that involves violating social norms and the rights of others (American Psychiatric Association, 2013). These behavioural issues are widespread, with the estimated worldwide prevalence of CD being 2-4% (Ayano et al., 2023; Polanczyk et al., 2015; Sacco et al., 2022). Numerous studies have found that children with CD often experience internalising difficulties such as anxiety and depression (Boylan et al., 2007; Cunningham & Ollendick, 2010; Marmorstein, 2007; Polier et al., 2012), and it has been shown that conduct issues are a predictor of increased internalising symptoms in later childhood (Fanti et al., 2019). The subgroup of young people with CD who also have callous-unemotional (CU) traits, a distinct set of traits that can present with or without CD, show both an earlier onset (Dandreaux & Frick, 2009) and a more severe and enduring pattern of conduct issues (Eisenbarth et al., 2016). This subgroup is also associated with poorer responses to treatment, making them especially notable from a clinical perspective (Essau et al., 2006; Frick et al., 2014a; Hawes et al., 2014). It remains unclear, however, whether the presence of high CU traits has an impact on the severity of internalising symptoms in children with CD. This chapter aims to address this by performing a meta-analysis investigating the effect of the level of CU traits on internalising symptoms in children and adolescents with CD.

It is well established that children with CD exhibit an increased prevalence of comorbid internalising symptoms such as anxiety and depression (Polier et al., 2012). Among children experiencing conduct problems, over half additionally meet the criteria for depression, and over 30% of young people diagnosed with depression also exhibit conduct problems (Green et al., 2002). The positive relationship between conduct problems and

anxiety has been described as somewhat perplexing (Robertson, 2021), as these symptoms are thought to impact behaviour in opposite ways. Specifically, anxiety is positively associated with increased levels of behavioural inhibition (e.g., Biederman et al., 1990; White et al., 2011) and overly cautious behaviour (e.g., Gagné & Radomsky, 2020), while externalising disorders are marked by decreased levels of behavioural inhibition, fearfulness, and heightened impulsivity (Krueger et al., 2001; Young et al., 2009). It has been suggested that it is the consequences of such antisocial behaviours in children with CD that lead to their failures in social and education, increasing children's likelihood of experiencing anxiety (Burke et al., 2005; Fanti et al., 2019; Frick et al., 1999; Moilanen et al., 2010; Patterson & Stoolmillet, 1991).

A distinct subgroup of young people with CD also presents with CU traits, characterised by a lack of empathy, remorse, and concern for others' feelings (Essau et al., 2006; Frick et al., 2014a; Viding et al., 2014). Although present in only 25-30% of children and adolescents exhibiting severe behavioural issues (Kahn et al., 2013), young people with these traits form the Limited Prosocial Emotions (LPE) specifier of CD in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; APA, 2013). Youths with high levels of CU traits, regardless of whether they have a CD or not, demonstrate a particularly severe and persistent pattern of antisocial behaviour, marked by more instrumental and premeditated aggression than their counterparts without these traits (Kruh et al., 2005; Leistico et al., 2008). This has led to a wealth of research investigating how the presence of high CU traits in conduct-disordered youth impacts their experiences of internalising symptoms (i.e., anxiety and depression).

The association between CU traits and anxiety in young people with CD has yielded mixed findings. A review by Frick et al. (2014a) reported that conduct problems are positively

associated with CU traits (Blair et al., 2014; Frick et al., 1999), and CU traits are associated with lower levels of anxiety (Pardini & Fite, 2010). However, given that children with CD are at a higher risk than children without CD of developing anxiety and depression (Polier et al., 2012), and at a higher risk than the general population of having CU traits, it is unclear how the presence of high CU traits in youth with CD may relate to these internalising symptoms. Some researchers have found that there is a higher positive correlation between conduct problems and anxiety when accounting for CU traits (Frick et al., 1999). Frick and colleagues (1999) explained this relationship by suggesting that the presence of CU traits in children reduces the potential distress caused by their antisocial behaviour. However, this is not consistent across the literature. In contrast to Frick et al.'s (1999) results, a recent review by Squillaci and Benoit (2021) reported mixed findings of the presence of internalising symptoms in children with oppositional defiant disorder or CD and high CU traits (Aghajani et al., 2017; Baroncelli & Ciucci, 2020; Graziano et al., 2019; McDonald et al., 2017). Such conflicting findings may be attributed, at least in part, to study designs that do not consider the heterogeneity in the characteristics of the samples.

To this end, the following subsections detail important considerations relating to factors contributing to heterogeneity in children with CD and CU traits. The subgroup analyses in the current review assessed whether factors, including sex, participant setting, CU trait grouping methods, CU trait and anxiety and depression assessment methods, and severity of conduct problems impacted differences in internalising problems between low and high CU trait groups.

Potential Factors Influencing the Relationship between CU Traits and Internalising Symptoms

Individual Differences

Various individual differences have been identified to be associated with both CU traits and internalising symptoms. Compared to boys, girls exhibit lower levels of CU traits, are less frequently diagnosed with CD, and are more likely to experience comorbid anxiety and depression (Frick & Nigg, 2012; Keenan et al., 1999; Michelielson et al., 2022; Sadler et al., 2013). Pardini et al. (2012) found that girls with CD without CU traits experienced more anxiety difficulties than girls with the CU subtype. Similarly, in Fanti et al. (2013), girls were reported to score higher on anxiety and depression. Considering these differences in presentation and comorbidity, sex is likely to play a role in shaping the relationship between CU traits and internalising problems in young people with CD.

Measurement of CU Traits

Differences in the operationalisation of CU traits, reporters and instruments may impact the outcomes of studies examining the link between CU traits and internalising symptoms (Sakki et al., 2023). Existing CU trait instruments include the Youth Psychopathy Traits Inventory (Garcia et al., 2019), Psychopathy Checklist: Youth Version (Andershed et al., 2007) and the Inventory of Callous-Unemotional Traits (ICU; Frick, 2004). Given that deceitfulness and deviant thinking are traits of psychopathy, the American Psychiatric Association (APA, 2013) recommends assessing CU traits by gathering input from various informants, such as the young person, their caregivers, and/or teachers. Thus, using single or multiple CU trait informants may potentially impact the overall effect of internalising symptoms.

The dimensional versus categorical nature of CU traits is a topic of debate (Frick et al., 2014b). While some studies categorise participants based on the presence or absence of CU traits, others classify them into high and low groups according to the degree of CU traits (e.g., Fanti et al., 2013). However, there is a lack of consistency regarding the definition of high CU traits. Some studies define high CU traits using criteria such as the sample median (e.g., Rowe et al., 2010) or employ the Limited Prosocial Emotions (LPE) specifier (e.g., Colins & Andershed, 2015). Nevertheless, no consensus exists on the most suitable approach for grouping CU traits or an agreed-upon cutoff value for the specifier threshold (Colins & Andershed, 2015). These different methods of forming groups may lead to variations in the composition of the low and high CU groups, potentially influencing the estimate of anxiety and depression.

Conduct Problems Severity

While conduct problems have a positive correlation with internalising symptoms (Fanti & Henrich, 2010), the relationship between CU traits and anxiety and depression is unclear in CD (Frick & White, 2008; Pardini & Loeber, 2008). If such a relationship exists, controlling for conduct problems can help determine whether the link between CU traits and internalising symptoms is partly influenced by the relationship between CU traits and conduct problems in children with CD. The current review aimed to include the severity of conduct problems as a potential covariate in the analysis.

Participant Setting

The context from which participants are recruited may influence the difference in estimates of internalising symptoms between young people with high and low levels of CU traits. Studies recruiting participants from mental health clinics or juvenile justice facilities may disproportionately sample individuals with elevated levels of CD and CU traits who

exhibit more severe externalising behaviours (Craig et al., 2021). Polier et al. (2012) reported that the prevalence of internalising symptoms was higher in clinic settings than in community samples, potentially due to the increased likelihood of comorbid psychiatric conditions and environmental stressors (Craig et al., 2021). The overrepresentation may skew the estimates of internalising symptoms.

Rationale and Aims

The primary aim of this review was to conduct a meta-analysis to investigate the impact of the level of CU traits on internalising symptoms (i.e., anxiety and depression) in young people with CD and ascertain any association between the severity of CU traits and internalising problems specifically within this population. Secondly, this review aimed to explore the potential influence of methodological factors that may impact differences and associations. Lastly, this review examined the role of conduct problem severity in moderating the potential relationship between CU traits and internalising problems through a meta-regression.

Methods

Identifying Primary Studies

Inclusion Criteria

The inclusion criteria were informed by reviews from Frick et al. (2014a), Waller et al. (2020) and Susch's (2021) meta-analysis on children and adolescents with CD and callous-unemotional traits. The current meta-analysis included children with high conduct problems by expanding the search criteria to contain conduct problems, conduct issues, conduct difficulties and conduct symptoms, as detailed below. Studies published from 1990 onwards measuring callous-unemotional traits and internalising symptoms in children with CD and high conduct problems were included. Additionally, eligible studies were required to report

means and standard deviations or an *r* effect size reporting on the relationship between CU and depression and/or anxiety outcomes. The full inclusion/exclusion criteria are described in Table 1.1.

Table 1.1

Inclusion and Exclusion Criteria

Inclusion Criteria	Justification
Participant Characteristics	
Children and adolescent populations up to the age of 18.	To establish the inclusion of data from studies involving children and adolescents. Previous reviews in this area, such as those conducted by Frick et al. (2014a) and Waller et al. (2020), have typically focused on populations diagnosed with CD and conduct problems within this age range.
All participants must have a diagnosis of CD or score high on conduct problems, as determined by the authors.	Conduct disorders and problems represent core features of the population of interest in this meta-analysis. In studies that report conduct problems, data is only included from subgroups where all participants scored high on conduct problems (as determined by the authors) to ensure methodological rigour by maintaining consistency in participant characteristics across studies.
Studies that include a CU trait subgroup(s) of participants with CD (only required for standardised mean difference meta-analysis)	In the meta-analysis of group-based differences, including participants with different levels of CU traits enables comparisons between the subgroups. In the second meta-analysis, correlational studies should include CU traits in participants with CD. Including studies that use validated measures of CU traits is crucial for upholding the internal validity of the meta-analysis. Employing validated measures of CU traits, including CU subscales derived from psychopathy assessments, ensures a uniform approach to operationalising CU traits. This consistency enhances the comparability and reliability of findings across studies, contributing to a more robust and credible analysis.
Outcome data	
The studies must report Means and Standard Deviations of internalising symptoms, F-test statistics, Cohen's *d* effect size or an *r* effect size of the relationship between CU and internalising symptoms.	To ensure that outcomes can be converted into an effect size.

Inclusion Criteria	Justification
Outcome measure	
Studies reporting depression or anxiety, including Generalised Anxiety Disorder (GAD). Studies reporting a combination of anxiety and depression were also included. Studies reporting data for specified anxiety disorders that were not GAD were excluded.	The meta-analysis centred its focus exclusively on depression and anxiety. Omitting studies reporting anxiety disorders beyond GAD was intended to emphasise the exploration of broader psychological experiences associated with depression and anxiety rather than symptoms linked to specific challenges or circumstances (i.e., separation anxiety). Furthermore, including more distinct anxiety disorders with limited empirical support would likely compromise the reliability of estimates and hinder the feasibility of subgroup analyses.
Type of article	
Studies published in the English language.	The author is a native English speaker, and resources for translating other languages were inaccessible.
The following articles were excluded: meta-analyses, theoretical papers, reviews, commentaries, clinical guidance, non-outcome-focused studies, and qualitative papers.	Articles of this nature do not report outcome data required for the current meta-analysis.
Studies published from 1990 onwards.	This criterion ensured a focus on the latest research findings. Secondly, definitions of CU traits and psychopathic traits before 1990 often relied heavily on the definition of undersocialised CD (Quay, 1987).

Search of Electronic Databases

A systematic literature search was conducted on 30th June 2023 using PsychINFO, Embase, Web of Science, and Pubmed. The search aimed to obtain a comprehensive overview of the literature on the relationship between CU traits, anxiety, and depression in young people with CD or conduct problems. The search terms that were used to identify these studies were informed by existing reviews in the area (Frick et al., 2014a; Waller et al., 2020) and developed by Susch et al. (2021). The current author extended the conduct problem search terms to include "conduct problem*, conduct issue*", "conduct difficult*" and "conduct symptom*" as outlined in Table 1.2 below. The current meta-analysis adhered to

and implemented the guidelines set forth by Page et al. (2021) in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Checklist (PRISMA Checklist; Appendix 1) and was registered on Prospero (ID: CRD42023433128).

Table 1.2

Search Criteria

Construct	**Free Text Search Terms**	**Method of Search**	**Limits**
Conduct problems	"conduct disorder" "conduct problem*" "conduct issue*" "conduct difficult*" "conduct symptom*" delinquen*	All search terms combined with *OR* and constructs combined with *AND*	Articles 1990- 30 June 2023 PsychINFO & Pubmed limits: human studies, English language, age up to 18. Embase limits are as above, with the addition of articles. Web of Science limits: article, English language
Callous-unemotional traits	"Callous unemotional" "Callous-unemotional" "Limited prosocial Emotions" Callous Unemotional "CU trait*" psychopath psychopathy psychopaths psychopathic		
Depression and Anxiety	"Mental health" "mental illness" "mental disorder" "Emotional problems" Psychopathology Internalising Internalizing Depression "depressive disorder" "Mood disorder" Anxiety Anxious "Generalised anxiety disorder"		

Construct	Free Text Search Terms	Method of Search	Limits
	"Generalized anxiety disorder" Dysthym*		
Children and adolescents	child* adolescen* juvenile youth girl* boy* infan* teen* paediatric* pediatric*		

Data Extraction

The author extracted all data. The following details were extracted from studies: the first author and year of publication; study design; country; sample size; participant setting; participant demographics (i.e., mean age, sex); conduct problem score; conduct problem measure (scale used, informant); methods used to devise CU trait groups; CU trait measure (instrument, informant); anxiety and depression measure (instrument, informant); statistics on group differences or correlations including means, standard deviations and *r* values.

Within the meta-analysis, studies reporting on anxiety, depression, and the combined outcome of anxiety and depression were identified through a labelling system. Expressly, the suffix 'A' indicated anxiety, 'D' indicated depression, and 'AD' indicated the combined outcome, which was added to the study label. When effects were separated by sex, they were included as estimates for independent samples of females and males. These estimates were indicated by the suffix 'F' denoting females or an 'M' indicating males. Notably, some

studies, such as Pardini et al. (2012), reported data at two distinct time points, using an additional suffix, ‘Y’, to signify the sample when participants were younger.

Risk of Bias Assessment

Given the diverse methodologies presented in the studies included in this meta-analysis, a study hierarchy (Table 1.3) was established. This hierarchy indicates the relative position of each study based on the expected quality of evidence derived from various methodologies. A set of criteria was developed for evaluating the risk of bias across five domains: selection bias, detection bias, statistical bias, reporting bias, and generalisation bias (Table 1.4). These criteria were adapted from established frameworks for assessing bias, such as The Cochrane Collaboration Risk of Bias Tool (Higgins et al., 2011) and the Risk of Bias Assessment Tool for Nonrandomised Studies (Kim et al., 2013). The quality index, expressed as a percentage, was determined by the sum of the study design score (as depicted in Table 1.3) and the risk of bias ratings (2 for low risk, 1 for unclear risk, and 0 for high risk) across the five domains (Table 1.4.), contributing to a maximum quality score of 35.

Table 1.3

Study Design Hierarchy

Study Design	Description	Quality Score
Prospective case-cohort study	It involves following a group of individuals over time to observe the development of a particular outcome, in this case, anxiety and depression levels, among young people with CD/conduct problems who exhibit high or low levels of CU traits.	20
Retrospective Case Cohort Study	It involves gathering data from a cohort that was established in the past (in this case, participants who have demonstrated CU traits and anxiety and depression symptoms). Participants within the cohort are categorised based on their CU trait severity.	15
Case-control study	Study in which participants are already identified as having CD/conduct problems and CU traits and compared for anxiety and depression with participants who do not have CU traits. Medical records and patient recall are used for data collection.	10
Cross-sectional studies	It involves observing a particular group of people (individuals with CD/conduct problems) at one specific time point or over a designated time frame to investigate the relationships between symptoms of anxiety and depression and the CU traits. Both symptoms of anxiety and depression and categories of CU traits are assessed simultaneously.	10

Table 1.4

Criteria for Ratings of Low, Unclear and High Risk across Five Domains

Domain	Details	Risk of Bias
Selection Bias	Were attempts undertaken to mitigate systematic differences in characteristics between individuals selected for the study and those who were not?	High Risk: The study sample is drawn from a narrow population that does not adequately represent the broader population of interest (e.g., only recruiting from a single service). Unclear Risk: Lack of information on recruitment methods. Low Risk: The participant selection strategy is broad, encompassing a wide geographical area and multiple services.
Detection Bias	Are the measures employed for detecting depression and anxiety deemed appropriate?	High Risk: Using solely adult informants for reporting (for children over 8). Unclear Risk: Use of child informant for reporting. Low Risk: Use of combined adult (parent/teacher) and child reports.
Statistical Bias	Have suitable statistical methodologies been employed? Is there any missing data due to attrition?	High Risk: Using an arbitrary approach to dichotomising groups, such as employing a median split and missing data ranging from 20% to 30% or over 30% missing data. Unclear Risk: Arbitrary methods of dichotomising groups, e.g., median split or missing 20-30% of data. Low Risk: Groups were formed based on clinical or normative cut-offs to identify LCU and HCU traits. The dataset demonstrates either less than 10% missing data or 10-20% missing data, accompanied by a clear description of the methodology utilised to manage missing data.
Reporting Bias	Has selective outcome reporting been observed, for instance, reporting only significant results? Are there measures mentioned in the method section that have not been reported in the results?	High Risk: Only a subsample of results was reported, or only significant results were reported. Unclear Risk: Incomplete reporting of methods, analyses or results. Low Risk: All results of measures as outlined in the method were reported.
Generalisation bias	Can the research findings be	High Risk: A minimal number of participants ($n < 30$) were recruited from a population with minimal

Domain	Details	Risk of Bias
	generalised to settings other than those in which they were initially tested? Are there any differences between the study participants and individuals to whom the review findings are applicable?	comorbidities, such as individuals exclusively diagnosed with CD without any comorbidity with Attention-Deficit/Hyperactivity Disorder (ADHD). Unclear Risk: Studies with a sample size (n = 30-150) where the precise geographical or recruitment location remains ambiguous. Studies with a selection strategy potentially influence result generalisability, such as providing feedback in exchange for participation. This might lead to increased involvement of parents seeking help, oversampling in low-income neighbourhoods, or recruitment solely from juvenile or health services. Low Risk: Studies with a sample size (n > 150) and a diverse participant pool encompassing individuals from various geographical regions.

Effect Measures

Standardised Mean Difference Studies

Outcomes were reported as a mean or mean difference, standard deviation, and sample size for each outcome group. Pauli et al. (2020), Rowe et al. (2010) and Vanwoerden et al. (2016) presented data as the percentage of participants that fulfilled the diagnostic criteria for Generalised Anxiety Disorder (GAD) and Major Depressive Disorder (MDD). In this case, the log odds ratio was calculated from two dichotomous variables: the number of participants with and without GAD and MDD in low and high callous-unemotional traits. This was used to calculate the log odds ratio and then convert it to an effect size of *d* using the high callous-unemotional (HCU) and low callous-unemotional (LCU) sample sizes. Pardini et al. (2012) presented data as means and standard errors, which were converted into standard deviations before the meta-analysis.

There were no multiple measures of the same outcome in the primary studies. However, there were cases in which the same outcome measure was used in numerous

subgroups; for example, in Loney et al. (2006), anxiety and depression were reported separately for males and females.

Correlational Studies

Associations between CU traits and internalising symptoms were reported as zero-order Pearson's *r* correlation coefficients for correlational studies. For outcomes reported using nonparametric measures of association (e.g., Dolan & Rennie, 2007, used Spearman's Rho), the Pearson coefficient was approximated using the transformations reported by Rupinski and Dunlap (1996).

The author conducted two separate meta-analyses to assess the overall effects, encompassing study designs of group differences and correlational studies. One meta-analysis focused on studies reporting standardised mean differences between HCU and LCU trait groups, while the other synthesised studies reported correlations between CU traits and internalising symptoms (i.e., anxiety, depression and/or combined anxiety and depression).

Defining Problematic Variance

Higgins I^2 (Higgins & Thompson, 2002) is a widely used metric for heterogeneity, with higher I^2 values indicating greater variation in the effect that cannot be attributed to true differences in its distribution within the population. Given the substantial methodological diversity among the primary studies used for the meta-analytic synthesis, problematic heterogeneity was defined as an I^2 value exceeding 75%. Due to the problematic heterogeneity observed, subsequent analyses concentrated on identifying the sources of heterogeneity among the standardised mean difference estimates and correlational studies.

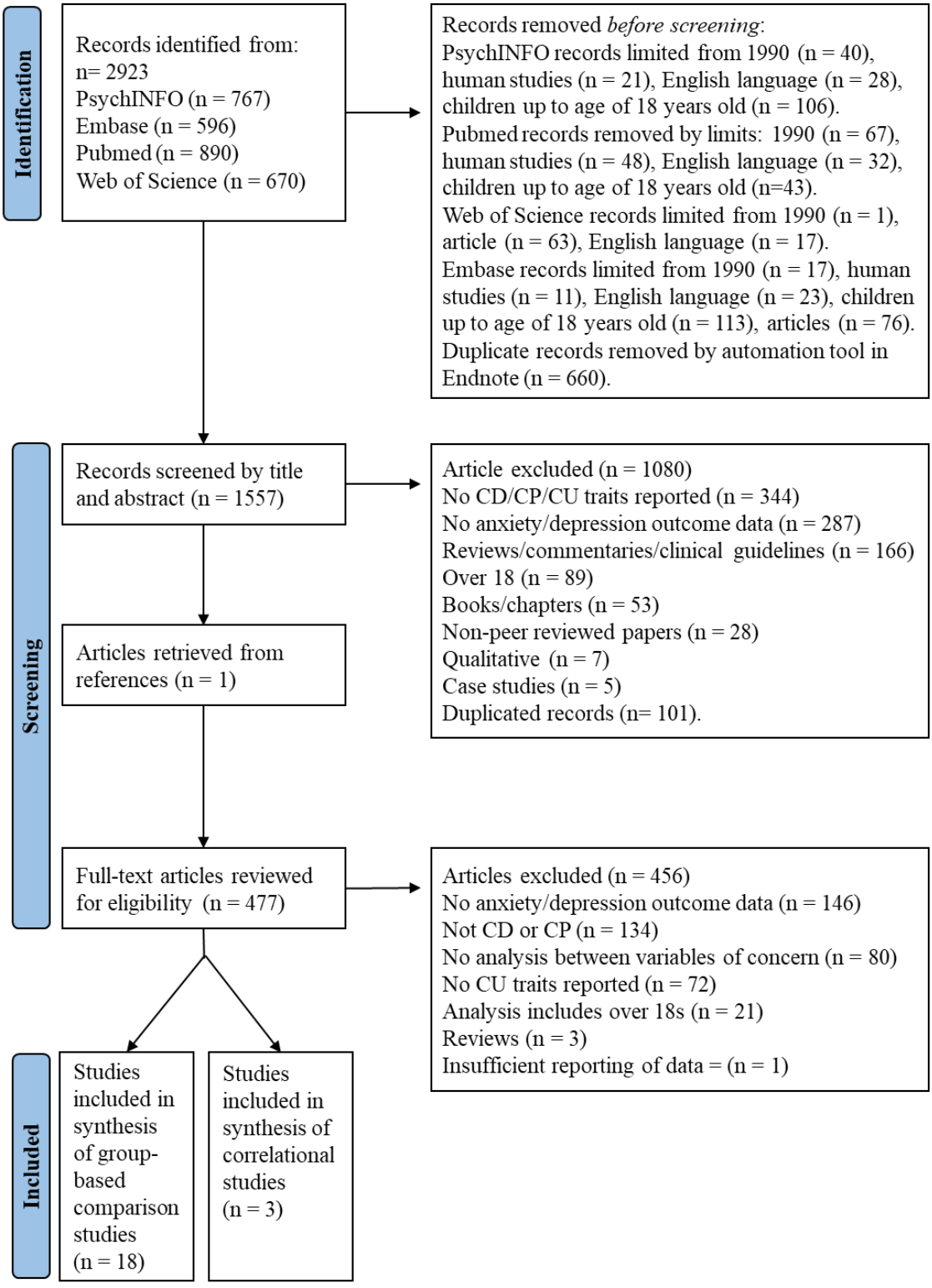
Results

Search and Selection Process

The search yielded 2923 articles, but after removing duplicates, the final count was reduced to 1557 (refer to Figure 1.1 for PRISMA flowchart). The exclusion criteria, study titles, and abstract were used to screen these articles. The three most common reasons for exclusion were that participants did not have a CD or conduct problems (k = 344), no outcome data for anxiety or depression (k = 287), and non-outcome focused studies (i.e., reviews, theoretical papers, commentaries, clinical guidance, k = 166). The full text of the remaining articles (k = 477) was then reviewed against the exclusion criteria. Five studies initially appeared to meet the inclusion criteria but were ultimately excluded from the analysis. Among these, Andrade et al. (2015), Craig et al. (2023), and Goulter et al. (2023) employed cluster analysis techniques and latent profile analysis, respectively, utilising CU trait scores and anxiety scores to delineate variations within CU traits, including primary and secondary variants. These data-driven analyses aimed to uncover distinct groupings within the dataset based on the CU traits and anxiety scores. Consequently, these studies did not provide separate mean scores for anxiety within the CU groups. Additionally, Molineuvo et al. (2020) included individuals up to 22 years of age in their analysis, exceeding the specified age range of the inclusion criteria, thereby leading to their exclusion from the meta-analysis. Colins & Vermeiren (2013) were identified by examining the references of papers. However, they did not report sufficient data to be included in the synthesis. This brought the final number of articles included in the meta-analysis to 21.

Figure 1.1

PRISMA Flow Chart of the Study Selection Process (From Page et al., 2021).



Study Characteristics

Twenty-one studies reported a total of 1983 participants, of which 263 were from correlational studies (for more study characteristics, refer to Table 1.5). Participants' ages across the studies spanned from three to 18 years, with a weighted mean age of 12.74, excluding Pardini et al. (2012) due to not providing mean age. Recruitment sources varied, including community settings, specialised behavioural provision schools, youth offending services, schools, and mental health services. Participants were drawn from diverse locations such as the UK, USA, Belgium, Australia, China, Cyprus, and Germany. Additionally, one estimate by Pauli et al. (2021) involved children and young people recruited from 11 sites across Europe. Most of the 21 studies comprised all-male or mixed-sex samples, with four studies (Colins et al, 2015; Colins, 2023; Loney et al., 2006; Pardini et al., 2012) featuring exclusively female participants. Notably, of the mixed-sex studies, most included more male participants.

Table 1.5

Study Characteristics

Study Label	Male (%)	Mean Age	Participant Setting	Method to Devise CU Groups	CU Trait Reporter	CU Measure	Anxiety/ Depression Reporter	Anxiety/ Depression Measure	CP Measure
Bansal 2023 A	59	4.77	Community	Clinical cut-offs	Parent	ICU	Parent	CBCL	K-DBDS
Bansal 2023 AD	59	4.77	Community	Clinical cut-offs	Parent	ICU	Parent	CBCL	K-DBDS
Bansal 2023 D	59	4.77	Community	Clinical cut-offs	Parent	ICU	Parent	CBCL	K-DBDS
Benesch 2014 AD	Mixed*	8.9	Community and mental health service	Correlation study	Parent	ICU	Parent	CBCL	FBB-SV
Byrd 2018 AD	100	10.68	Mental health services	Clinical cut-offs	Young person and parent	APSD	Parent	CBCL	CBCL
Colins 2015 AD	0	15.76	Youth offenders	Clinical cut-offs	Young person	ICU	Young person	YSR	DISC-IV
Colins 2023 AD	0	15.74	Youth offenders	Clinical cut-offs	Young person	ICU	Young person	YSR	DISC-IV
Dadds 2011 A	100	8.93	Mental health services	Median split	Parent, young person, and teacher	APSD	Parent and young person	SDQ	DISCAP

Study Label	Male (%)	Mean Age	Participant Setting	Method to Devise CU Groups	CU Trait Reporter	CU Measure	Anxiety/ Depression Reporter	Anxiety/ Depression Measure	CP Measure
Dadds 2014 AD	100	7.55	Mental health services	Tertial split	Teacher and parent	APSD	Teacher, young person, parent	SDQ	DISCAP
Dolan 2010 A	100	16.27	Youth offenders	Correlational study	Young person	PCL: YV	Young person	STAIC	K-SADS
Fanti 2013 AD Y	68	12.12	Community	Latent profile analysis	Young person	ICU	Young person	YSR	YSR
Fanti 2013 AD	68	14.02	Community	Latent profile analysis	Young person	ICU	Young person	YSR	YSR
Jiang 2021 A	100	14.51	Mental health services	Median split	Young person	APSD	Young person	MASC	SDQ
Jiang 2023 A	86	14.45	Mental health services	Median split	Young person	APSD	Young person	MASC	SDQ
Loney 2006 A F	0	15.34	Community	Median split	Teacher and parent	APSD	Young person	RCMAS	ASI-4
Loney 2006 A M	100	15.62	Community	Median split	Parent	APSD	Young person	RCMAS	ASI-4
Pardini 2012 A	0	Range gave 6-8	Community	Clinical cut-offs	Teacher and parent	APSD	Parent	SCARED	ASI-4
Pardini 2012 D	0	Range gave 6-8	Community	Clinical cut-offs	Teacher and parent	APSD	Parent	CASI	ASI-4

Study Label	Male (%)	Mean Age	Participant Setting	Method to Devise CU Groups	CU Trait Reporter	CU Measure	Anxiety/ Depression Reporter	Anxiety/ Depression Measure	CP Measure
Pardini 2012 A Y	0	Range gave 6-8	Community	Clinical cut-offs	Teacher and parent	APSD	Parent	SCARED	CSI-4
Pardini 2012 D Y	0	Range gave 6-8	Community	Clinical cut-offs	Teacher and parent	APSD	Parent	CASI	CSI-4
Pauli 2021 A	47	13.89	Community specialist provision schools	Tertial split	Parent	ICU	Parent and young person	K-SADS	K-SADS
Pauli 2021 D	47	13.91	Community specialist provision schools	Tertial split	Parent	ICU	Parent and young person	K-SADS	K-SADS
Polier 2010 A	100	11.2	Mental health	Correlational study	Parent	APSD	Young person	STAIC	FBB-SSV
Polier 2010 AD		11.2	Mental health	Correlational study	Parent	APSD	Parent	CBCL	FBB-SSV
Rowe 2010 A	Mixed*	12.55	Community	Median split	Parent	CU questionnaire	Parent	SDQ	SDQ
Rowe 2010 D	Mixed*	12.55	Community	Median split	Parent	CU questionnaire	Parent	SDQ	SDQ

Study Label	Male (%)	Mean Age	Participant Setting	Method to Devise CU Groups	CU Trait Reporter	CU Measure	Anxiety/ Depression Reporter	Anxiety/ Depression Measure	CP Measure
Schwenck 2012 AD	100	12.29	Mental health services	Median split	Parent	ICU	Parent	CBCL	Observer Rating Scale
Sebastian 2016 A	100	14.25	School	Median split	Teacher and parent	ICU	Parent	CASI	CASI-CD
Sebastian 2016 D	100	14.25	Community	Median split	Teacher and parent	ICU	Parent	CASI	CASI-CD
Sethi 2018 A	100	14.59	Community and specialist provision schools	Median split	Teacher and parent	ICU	Parent	Not reported	SDQ
Sethi 2018 D	100	14.59	Community and specialist provision schools	Median split	Teacher and parent	ICU	Parent	Not reported	SDQ
Vanwoerden 2016 D	49	15.15	Mental health services	Median split	Young person	ICU	Young person	DSM-IV	DISC-IV
Viding 2012 A	100	14.46	Community and specialist provision schools	Median split	Teacher and parent	ICU	Parent	CASI	CASI-4R

Study Label	Male (%)	Mean Age	Participant Setting	Method to Devise CU Groups	CU Trait Reporter	CU Measure	Anxiety/ Depression Reporter	Anxiety/ Depression Measure	CP Measure
Viding 2012 D	100	14.46	Community and specialist provision schools	Median split	Teacher and parent	ICU	Parent	CASI	CASI-4R

Note. * Benesch et al., (2014) and Rowe et al., (2010) included mixed sex samples but did not report proportion of male/females. *ASI-4* Adolescent Symptom Inventory-4R, *CASI-4R* Child and Adolescent Symptom Inventory-4R, *CSI-4* Child Symptom Inventory-4R, *CBCL* Child Behaviour Checklist, *DISC-IV* Diagnostic Interview Schedule for Children, *DISCAP* Diagnostic Interview Schedule for Children, Adolescents and Parents, *FBB-SSV* Fremdbeurteilungsbogen Storung des Sozialverhaltens, *K-DBDS* Kiddie-Disruptive Behaviour Disorder Schedule, *K-SADS* Kiddie Schedule for Affective Disorders and Schizophrenia, *PCL: YV* Psychopathy Checklist: Youth Version, *SDQ* Strengths and Difficulties Questionnaire, *STAIC* State-Trait Anxiety Inventory for Children, *YSR* Youth Self-Report.

Risk of Bias

Selection Bias

Across the studies, the risk of selection bias was mostly low. Thirteen studies were rated as low risk of bias, as they used a broad selection strategy and described a clear recruitment process. Five studies were rated as unclear risk of bias as they lacked detail in their selection strategy. Three studies were rated as high risk of bias as they recruited participants from only one service (see Table 1.6). Recruiting participants from a single service may reflect convenience sampling rather than a systematic selection process. This can lead to biased estimates if certain groups are overrepresented or underrepresented in the sample.

Detection Bias

Five studies were rated as having a low risk of bias because they used measures with good psychometric properties and a combination of informants, including parents, teachers, and young people. Although Bansal et al. (2023) used parents as anxiety and depression informants, their mean sample age was 4.77 and therefore was rated as low risk of bias. To our knowledge, there is no available validated measure of anxiety or depression for children aged 3, as included in Bansal et al.'s (2023) sample. Most studies were rated as having an unclear risk of detection bias due to their use of sole carers or teacher informants to report anxiety and depression. Thirteen methods from eight studies relied on parental or carer reports of anxiety and depression and, therefore, were rated as high risk of bias. Self-report scales conducted with young people offer the benefit of capturing internalising symptoms associated with psychopathy that may not be readily accessible to parents or teachers to evaluate (Andershed et al., 2002; Essau et al., 2006).

Statistical Bias

Eight studies were rated as having a low risk of statistical bias as they categorised groups based on clinical or normative cut-offs to identify LCU and HCU traits. Twelve studies were rated as having an unclear risk of bias as they used arbitrary methods of dichotomising groups, such as using a median split or having 20-30% missing data. Pauli et al. (2020) were rated as having a high risk of statistical bias due to their method of devising groups and 28% missing data. Using median splits in research studies has been criticised for its potential to introduce statistical bias, as this approach to creating groups is believed to diminish discriminant power (McClelland et al., 2015). The diminished discriminant power arises because individuals with similar degrees of CU traits, positioned at the 49th and 5th percentiles, would be assigned to different categories (i.e., high/low CU groups).

Reporting Bias

Overall, no risk of bias was identified across studies as they all reported the results of their measures as outlined in their method.

Generalisability Bias

Small sample sizes emerged as a prominent concern regarding the generalisability of findings across studies. Seven studies were deemed to have a low risk of generalisability bias due to their sample sizes exceeding 150 participants. Twelve studies were rated as having an unclear risk of bias as they included sample sizes ranging from 30 to 150 participants. Lastly, two studies received a high-risk rating due to having fewer than 30 participants in their overall sample. This limitation poses challenges in extrapolating the results to broader populations of individuals with

conduct problems and CU traits, warranting cautious interpretation of the outcomes from the current meta-analysis.

Summary

Overall, the studies in the meta-analysis exhibited varying degrees of bias (Table 1.6). Notably, the risk of bias was higher across studies in the detection, statistical and generalisability domains. Conversely, reporting bias appeared to be relatively minimal across the studies. Owing to the limited number of studies in this field, those with unclear to high bias risks were included in further analysis, highlighting the need for caution in interpreting the meta-analysis results. Nonetheless, the selected studies are perceived to provide a representative overview of the current research literature. Future investigations should incorporate higher-quality methodologies and larger sample sizes to enhance understanding.

Table 1.6

Study Designs and Ratings of Risk of Bias Across Domains

Study Name	Study Design	Selection Bias	Detection Bias	Statistical Bias	Reporting Bias	Generalisability Bias	Quality Index
Bansal 2023 A	Prospective case cohort	Low risk	Low Risk	Low risk	Low risk	Low risk	83%
Bansal 2023 AD	Prospective case cohort	Low risk	Low Risk	Low risk	Low risk	Low risk	83%
Bansal 2023 D	Prospective case cohort	Low risk	Low Risk	Low risk	Low risk	Low risk	83%
Benesch 2014 AD	Cross-sectional	Low risk	Unclear risk	Low risk	Low risk	Low risk	48%
Byrd 2018 AD	Case-control	Unclear risk	High risk	Low risk	Low risk	Unclear risk	49%
Colins 2015 AD	Cross-sectional	High risk	Unclear risk	Low risk	Low risk	Unclear risk	46%
Colins 2023 AD	Cross-sectional	High risk	Unclear risk	Low risk	Low risk	Unclear risk	46%
Dadds 2011 A	Cross-sectional	Low risk	Low risk	Unclear risk	Low risk	Unclear risk	51%
Dadds 2014 AD	Cross-sectional	Unclear risk	Low risk	Low risk	Low risk	Low risk	54%
Dolan 2007 A	Cross-sectional	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	43%
Fanti 2013 AD Y	Cross-sectional	Low risk	Unclear risk	Unclear risk	Low risk	Low risk	51%
Fanti 2013 AD	Cross-sectional	Low risk	Unclear risk	Unclear risk	Low risk	Low risk	51%
Jiang 2021 A	Cross-sectional	Low risk	Unclear risk	Unclear risk	Low risk	Unclear risk	49%
Jiang 2023 A	Cross-sectional	Low risk	Low risk	Unclear risk	Low risk	Unclear risk	46%
Loney 2006 A F	Cross-sectional	Low risk	Unclear risk	Unclear risk	Low risk	High risk	49%
Loney 2006 A M	Cross-sectional	Low risk	Unclear risk	Unclear risk	Low risk	High risk	49%
Pardini 2012 D	Prospective case cohort	Low risk	Low risk	Low risk	Low risk	Low risk	78%
Pardini 2012 D Y	Prospective case cohort	Low risk	Low risk	Low risk	Low risk	Low risk	78%
Pauli 2021 A	Cross-sectional	Low risk	High risk	High risk	Low risk	Low risk	51%
Pauli 2021 D	Cross-sectional	Low risk	High risk	High risk	Low risk	Low risk	51%

Study Name	Study Design	Selection Bias	Detection Bias	Statistical Bias	Reporting Bias	Generalisability Bias	Quality Index
Polier 2020 A	Cross-sectional	Unclear risk	Unclear risk	Unclear risk	Low risk	High risk	38%
Polier 2020 AD	Cross-sectional	Unclear risk	High risk	Unclear risk	Unclear risk	High risk	33%
Rowe 2010 A	Cross-sectional	Low risk	High risk	Unclear risk	Unclear risk	Low risk	43%
Rowe 2010 D	Cross-sectional	Low risk	High risk	Unclear risk	Unclear risk	Low risk	43%
Schwenck 2012 AD	Case-control	Unclear risk	High risk	Unclear risk	Low risk	Unclear risk	46%
Sebastian 2016 A	Cross-sectional	Low risk	High risk	Unclear risk	Low risk	Unclear risk	49%
Sebastian 2016 D	Cross-sectional	Low risk	High risk	Unclear risk	Low risk	Unclear risk	49%
Sethi 2018 A	Cross-sectional	Low risk	High risk	Unclear risk	Low risk	Unclear risk	49%
Sethi 2018 D	Cross-sectional	Low risk	High risk	Unclear risk	Low risk	Unclear risk	49%
Vanwoerden 2016 D	Cross-sectional	High risk	Low risk	Unclear risk	Low risk	Unclear risk	46%
Viding 2012 A	Cross-sectional	Low risk	High risk	Unclear risk	Low risk	Unclear risk	49%
Viding 2012 D	Cross-sectional	Low risk	High risk	Unclear risk	Low risk	Unclear risk	49%

Note. The suffix ‘A’ indicated anxiety, ‘D’ indicated depression, and ‘AD’ indicated the combined outcome. When effects were separated by sex, they were included as estimates for independent samples of females and males. These estimates were indicated by the suffix ‘F’ denoting females or an ‘M’ indicating males. Notably, some studies, such as Pardini et al. (2012), reported data at two distinct time points, using an additional suffix, ‘Y’, to signify the sample when participants were younger

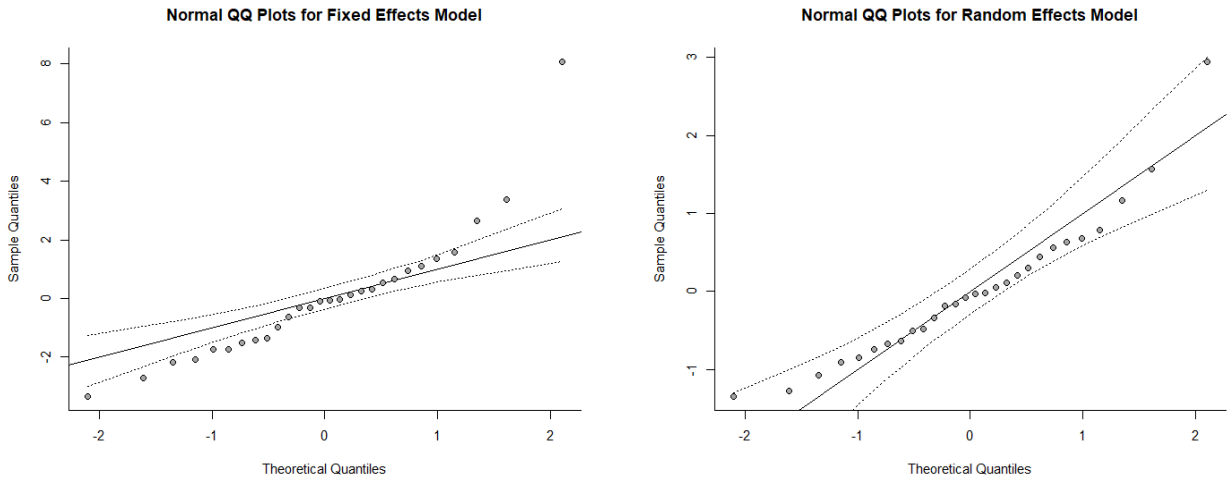
Meta-analysis: Mean Differences

The distribution of primary study effects is shown in Figure 1.2. The variance of the true effect (τ^2) was calculated using the Restricted Maximum Likelihood method estimator.

Figure 1.2

QQ Plot of the Distribution of Standardised Mean Difference within the Primary Studies

A *B*



Note. Panel A is the QQ plot for the Fixed Effects Model. Panel B is the Random Effects Model.

As can be seen from Figure 1.2, there is clear evidence of non-linearity in the distribution of the standardised mean differences when using the fixed effects model. Conversely, there is less evidence of non-linearity when using the random effects model. Therefore, this suggests that the random effects model utilising the Restricted Maximum Likelihood estimate is the appropriate method for estimating the variation of the true effect. This estimator has been demonstrated to be more robust to deviations from normality (Banks et al., 1985).

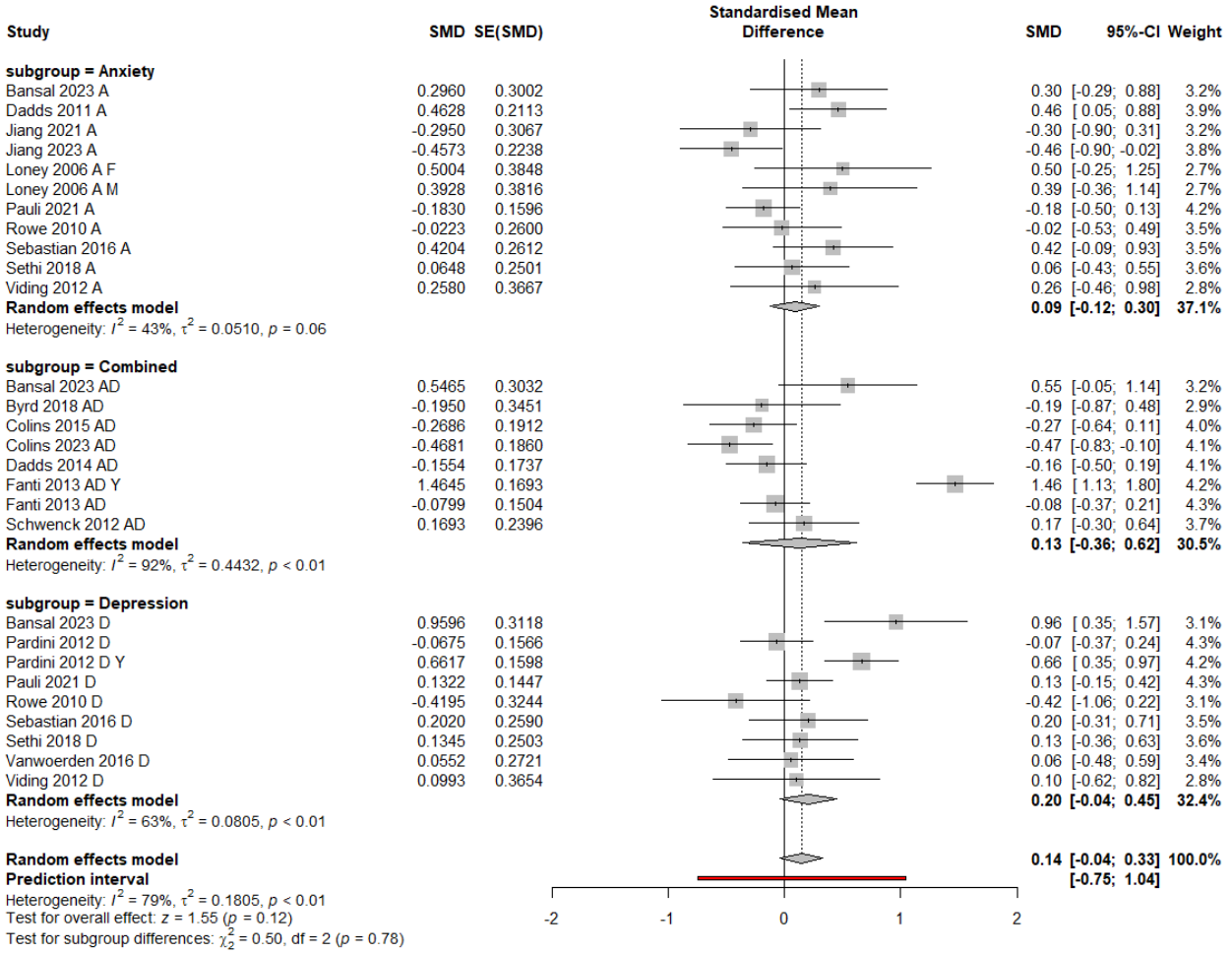
The Omnibus Test

A positive standardised mean difference suggests that the HCU trait groups exhibit higher average values of anxiety and depression compared to the LCU trait groups. Conversely, negative standardised mean difference values signify that the HCU trait groups reported lower anxiety and depression. Figure 1.3 details the standardised mean difference estimates provided in the primary studies, encompassing data from 26 effects taken from 18 studies.

A random effects model was calculated using the generic inverse variance method (see Figure 1.3). The random effects model suggested no significant difference in internalising symptoms between the HCU trait and LCU trait groups, SMD = 0.14 (95% CI −0.14; 0.33), $p = 0.12$. Whilst there was a trend for a larger group difference for depression than anxiety (with combined depression and anxiety having an intermediate value), there was no significant difference between the outcome type subgroups ($\chi^2 = 0.50$, $p = 0.78$), and for none of the outcome types individually was the group difference statistically significant. The results for the subgroup analysis of anxiety indicated that the SMD between CU trait groups = 0.09 (95% CI −0.12; 0.30), the SMD of depression = 0.20 (95% CI −0.04; 0.45), and the combined internalising problems SMD = 0.13 (95% CI 0.36; 0.62).

Figure 1.3

Forest Plot of the Standardised Mean Difference in Anxiety, Depression and Combined Scores Between Young People with CD/Conduct Problems and Low or High CU Traits



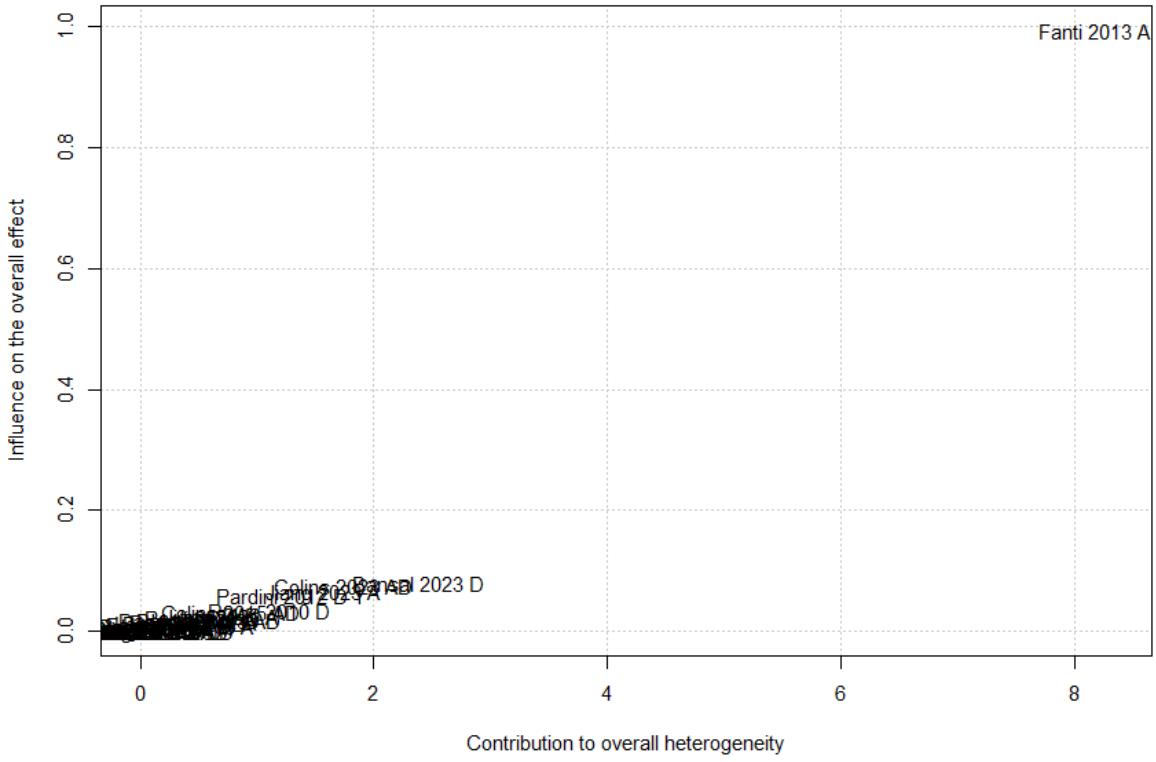
An overall unacceptable level of heterogeneity in the primary studies was observed (τ^2 = 0.18, Higgin's I^2 = 79%; Q = 125.6, p < .001). However, heterogeneity for each of anxiety and depression was separately acceptable (whilst for combined AD this was unacceptable). Therefore, the focus of the subsequent analyses was identifying the sources of heterogeneity between the estimates of SMD in the primary studies.

The Impact of Influential Primary Studies

The effects of disproportionate influence in studies were evaluated through a "leave-one-out" analysis. In this analysis, the random effects model was computed with the exclusion of each primary study in succession, noting the alterations in the weighted average effect size (referred to as influence) and the changes in heterogeneity (referred to as discrepancy). The outcomes of this "leave-one-out" analysis is illustrated on the Baujat plot (Baujat et al., 2002) in Figure 1.4.

Figure 1.4

Baujat Diagnostic Plot of Sources of Heterogeneity



Note. The Vertical Axis Reports the Study's Influence on the Overall Effect, and the Horizontal Axis Reports the Discrepancy Between the Study and the Rest of the Literature.

The Baujat diagnostic plot, which identifies sources of heterogeneity, distinctly highlights Fanti et al. (2013) AD Y as both influential and discrepant from the current literature in Figure 1.4. Subsequently, the estimate attributed to Fanti et al. (2013) AD Y underwent re-assessment for risk of bias to determine the potential impact of its exclusion from the synthesis. No clear rationale for its removal was discerned; thus, it was retained in the synthesis.

An exploratory analysis was completed without Fanti et al. (2013) AD Y to assess what impact removing it would have. The test returned a smaller estimate for SMD (0.06), which remained non-significant ($z = 1.10$, $p = 0.27$).

Subgroup Analyses

The Effect of Risk of Bias in the Primary Studies

Subgroup analyses were undertaken on the SMD to investigate how the risk of bias at the study level affects heterogeneity. The analyses focused on two categories of bias risk: "low risk" and "any risk" (which combines unclear and high risk). This examination was conducted for each of the five types of methodological bias (Table 1.3). Significant differences between the SMDs for internalising symptoms were observed between studies rated as low versus any risk for selection bias (Table 1.7). In studies with a low risk of selection bias, pooled SMD was greater (more positive) than for studies with any risk of bias in this domain, SMD = 0.23 (95% CI 0.02; 0.44) (Figure 1.5). The subgroup analysis of the effect of risk of bias in the other domains did not suggest a significant difference.

Table 1.7

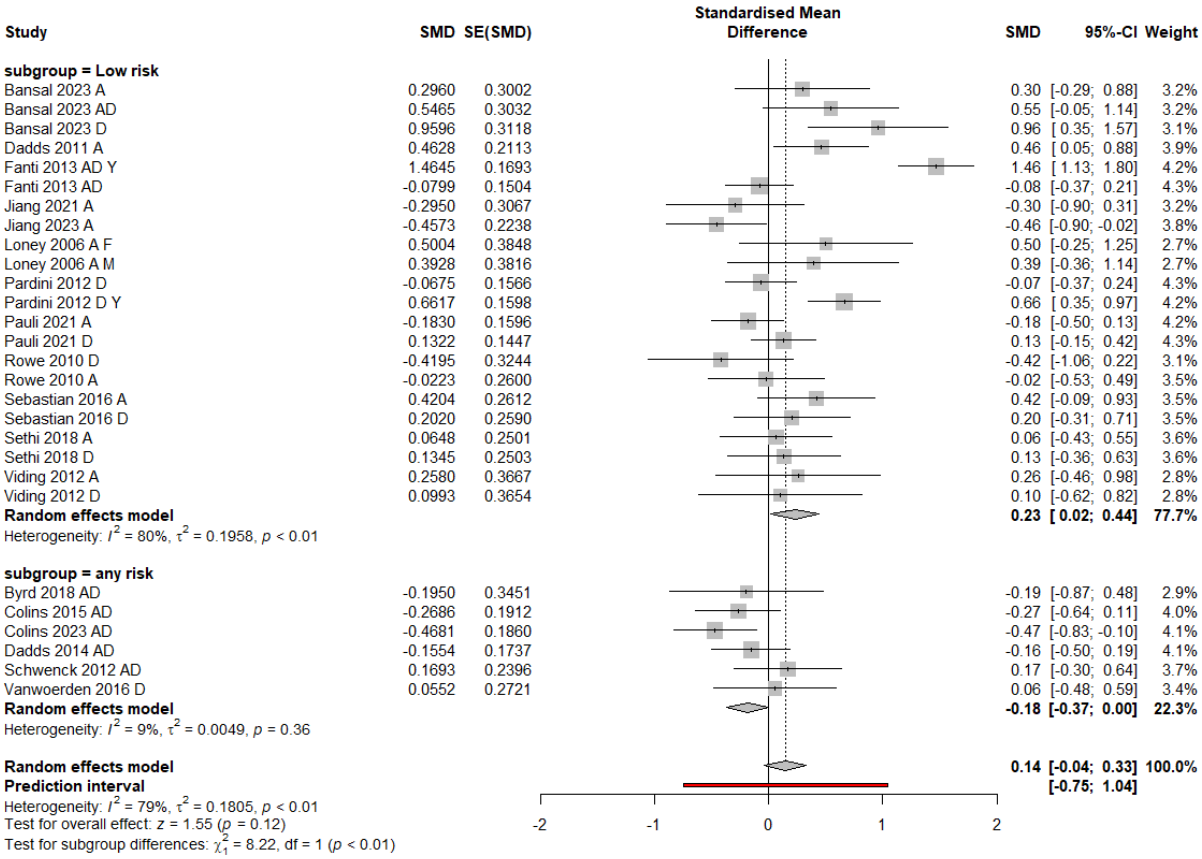
A Subgroup of Analysis of the Effect of Risk of Bias

	Low Risk			Any Risk				
Risk of Bias	**SMD**	**95% CI (LL; UL)**	***k***	**SMD**	**95% CI (LL; UL)**	***k***	χ^2	***p***
Selection Bias	0.23	0.02; 0.44	12	−0.18	−0.37; 0.00	6	8.22	0.00
Detection Bias	0.17	−0.06; 0.41	5	0.11	−0.14; 0.37	15	0.13	0.72
Statistical Bias	0.12	−0.19; 0.44	6	0.16	−0.08; 0.39	12	0.03	0.86
Reporting Bias	0.14	−0.04; 0.33	18					
Generalisability Bias	0.26	−0.06; 0.58	6	0.03	−0.14; 0.20	12	1.51	0.22

Note. CI confidence interval. *UL* upper limit. *LL* lower limit.

Figure 1.5

Forest Plot of the Standardised Mean Difference in Risk of Selection Bias in Studies



To explore the impact of study-level covariates on depression and anxiety, a series of subgroup analyses were carried out, as shown in Table 1.8. The subgroup analysis revealed that participant setting, and the anxiety and depression scale used significantly impacted the observed effect size of anxiety and depression outcomes between HCU trait groups and LCU trait groups. Studies with samples recruited from the community had the largest SMD = 0.38 (95% CI 0.06; 0.70). There was a variety of anxiety and depression scales used across studies which formed very small subgroups in the analysis.

Table 1.8

Subgroup Analysis of Study Factors

Moderator	Level	SMD	95% CL UL; LL	*k*	χ^2	*p*
Sex[a]	Mixed	0.21	−0.16; 0.58	6	0.31	0.86
	Male	0.12	−0.03; 0.27	9		
	Female	0.05	−0.40; 0.49	4		
Participant Setting	Community	0.38	0.06; 0.70	5	13.92	0.01
	Community and specialist provision schools	0.12	−0.16; 0.41	2		
	Youth offenders	−0.37	−0.63; -0.11	2		
	Mental health services	−0.04	−0.29; 0.20	7		
	Community, mental health services, youth offenders	−0.02	−0.33; 0.29	2		
Methods Used to Devise CU Groups	Clinical cut-offs	0.16	−0.19; 0.52	5	2.35	0.50
	Median split	0.23	−0.01; 0.47	10		
	Tertial split	−0.05	−0.26; 0.15	2		
	Latent profile analysis	0.69	−0.82; 2.20	1		
CU Trait Informant	Young person	<0.001	−0.57; 0.57	6	3.35	0.50
	Parent	0.19	−0.04; 0.41	5		
	Combined parent and young person	−0.20	−0.87; 0.48	1		
	Combined teacher and parent	0.18	−0.04; 0.39	5		
	Combined parent, young person, teacher	0.46	0.05; 0.88	1		
CU Trait Scale	ICU	0.21	−0.04; 0.47	10	2.63	0.27
	APSD	0.09	−0.20; 0.38	6		
	Observer Rating Scale	−0.18	−0.58; 0.22	1		
Anxiety/Depression Informant	Young person	0.09	−0.45; 0.63	5	4.62	0.20

Moderator	Level	SMD	95% CL UL; LL	*k*	χ^2	*p*
	Parent	0.24	0.07; 0.41	9		
	Combined parent and young person	0.06	−0.18; 0.31	3		
	Combined parent, young person, teacher	−0.16	−0.50; 0.19	1		
Anxiety/Depression Scale	CBCL	0.36	0.00; 0.71	3	26.07	0.00
	YSR	0.16	−0.70; 1.03	3		
	SDQ	0.00	−0.36; 0.35	3		
	MASC	−0.40	−0.76; −0.05	2		
	RCMAS	0.45	−0.08; 0.98	1		
	ASI-4R	−0.07	−0.37; 0.24	1		
	CSI-4R	0.66	0.35; 0.97	1		
	K-SADS	−0.02	−0.33; 0.29	1		
	CASI-4R	0.20	−0.03; 0.42	3		
	DISC-IV	0.06	−0.48; 0.59	1		

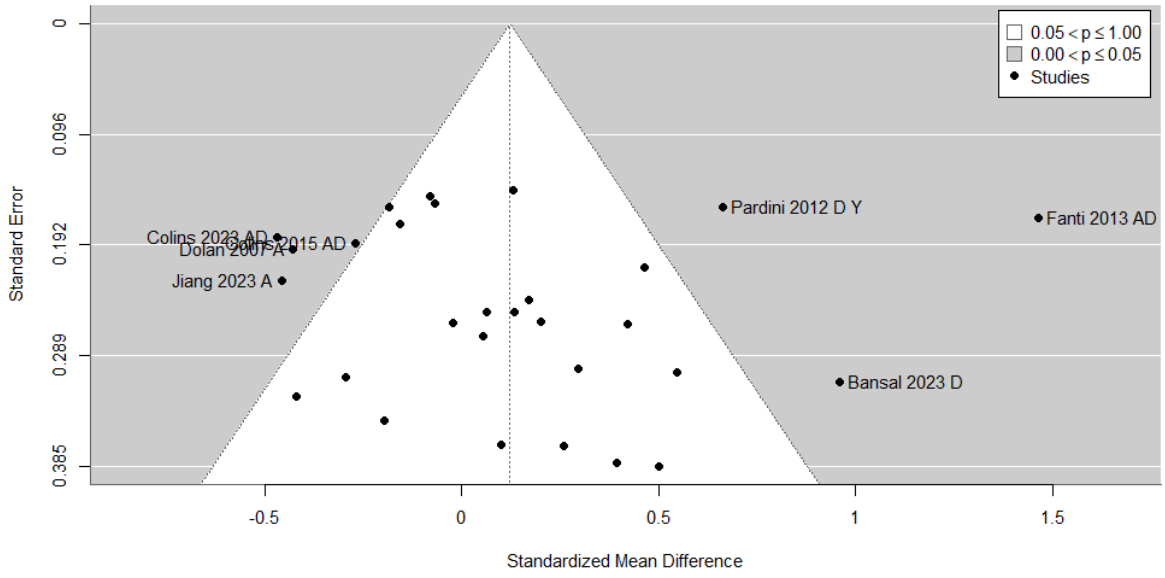
Note. [a] Excluding Rowe et al. (2010) who did not provide data on sex. *CI* confidence interval, *LL* lower limit, *UL* upper limit. *APSD* Antisocial Process Screening Device, *ASI-4* Adolescent Symptom Inventory-4R, *CASI-4R* Child and Adolescent Symptom Inventory-4R, *CSI-4* Child Symptom Inventory-4R, *CBCL* Child Behaviour Checklist, *DISC-IV* Diagnostic Interview Schedule for Children, *DISCAP* Diagnostic Interview Schedule for Children, Adolescents and Parents, *ICU* Inventory of Callous-Unemotional Traits, *K-DBDS* Kiddie-Disruptive Behaviour Disorder Schedule, *K-SADS* Kiddie Schedule for Affective Disorders and Schizophrenia, *SDQ* Strengths and Difficulties Questionnaire, *YSR* Youth Self-Report. Pardini et al., (2012) used CSI-4R with their younger sample and ASI-4R with their older sample.

The Impact of Publication and Small Study Biases

The funnel plot of the standardised mean difference in anxiety and depression outcomes reported a test of asymmetry t (26) = 0.13, p = 0.90 (Figure 1.6). There was no clear evidence of publication bias in the distribution of SMD of anxiety and depression between participants with LCU and HCU traits. Therefore, there was no simulation or adjustment for publication bias and small study effects.

Figure 1.6

Funnel Plot of the Standardised Mean Difference of Anxiety and Depression



Note. The 95% confidence interval of the expected distribution of standardised mean difference is shown as an inverted "funnel".

Meta-Regression of Group-Based Mean Differences

The current review aimed to include the severity of conduct problems as a potential covariate in the analysis. However, poor reporting of conduct problem scales meant only four studies with seven outcomes were identified. Meta-regression analyses are generally cautioned against when the number of included studies is fewer than ten (Higgins et al.,

2019). Therefore, continuing the meta-regression for conduct problems was deemed inappropriate.

The mean age of participants was also assessed as a potential covariant using a meta-regression. The findings indicated that the SMD was not moderated significantly by the mean age of participants, SMD = −0.05 (k = 26, Q_M = 3.03, p = 0.08). Pardini et al. (2012) did not report the mean age of their participants and, therefore, was not included in this moderator analysis.

Meta-analysis: Correlational Studies

Study Characteristics

In total, 296 male participants, aged six to 16 years old, diagnosed with CD, were included in these studies. Participants were recruited from diverse settings such as community environments, young offender institutions, and secure care facilities in Germany and the United Kingdom.

The Omnibus Test

Three correlational studies documented four correlations between anxiety, mixed anxiety depression, and CU traits among youths with CD (refer to Table 1.9). The analysis was conducted utilising the fixed effects model due to the constrained number of studies reporting correlation coefficients. The selection of the fixed effects model over the random effects model in this context mitigates the potential for computing inaccurate estimates (Borenstein et al., 2007). The fixed effects model (Figure 1.6) yielded a synthesis of r = 0.08 (95% CI −0.26; 0.10). Given the limited number of studies available, no further analysis was pursued.

Table 1.9

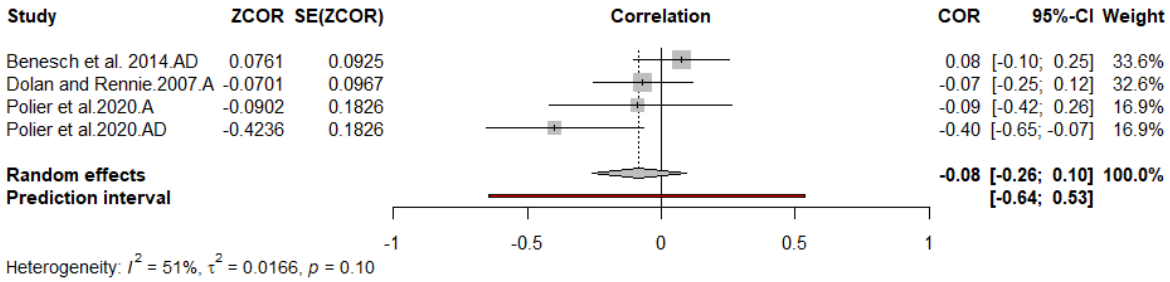
Correlations Between Anxiety and Mixed Anxiety and Depression in Young People with Conduct Problems

Study ID	COR	95% CI (LL; UL)	Weight (fixed)
Benesch (2014) AD	0.08	−0.11; 0.26	117
Dolan (2007) A	−0.07	−0.26; 0.12	107
Polier (2020) A	−0.09	−0.45; 0.27	30
Polier (2020) AD	−0.42	−0.78; −0.07	30

Note. CI confidence interval.

Figure 1.7

Forest Plot of the Correlational Studies of the Relationship Between CU Traits and Internalising Symptoms



The overall effect of the correlational estimate was not significant. Specifically, three estimates provided by Dolan and Rennie (2007) and Polier et al. (2010) demonstrated a negative correlation between CU traits, anxiety, combined anxiety and depression among young participants with CD. In contrast, Benesch et al. (2014) reported a positive correlation, indicating that as CU traits increased, combined anxiety and depression also increased within their sample of children with CD.

Discussion

This meta-analysis aimed to quantify the relationship between CU traits and internalising symptoms in children and adolescents with high conduct problems or CD. The

analysis showed that the weighted pooled standardised mean difference in anxiety and depression between high and low CU traits was not significant. Additionally, there were no significant differences when considering each specific type of internalising problem, (anxiety, depression or combined anxiety and depression). The meta-analysis of correlational data found no evidence to support an association between the level of CU traits and internalising symptoms. Given that rates of internalising problems are high in young people with CD (Green et al., 2002), the current review results suggest that clinicians should be mindful of the potential presence of comorbid emotional problems in children diagnosed with CD, regardless of whether high levels of CU traits are identified.

This absence of a relationship between the level of CU traits and internalising symptoms suggests that sub-categorising young people with CD based solely on CU traits is not effective at predicting their levels of anxiety and depression. The studies included in the meta-analysis presented contradictory findings: some suggested a positive relationship between CU traits and internalising symptoms (Bansal et al., 2023; Dadds et al., 2011; Fanti et al., 2013, in girls), while others indicated a negative relationship (Jiang et al., 2023; Sethi et al., 2018) or no difference at all (e.g. Loney et al., 2006). The findings of the meta-analysis indicate that there is no overall difference in internalising symptoms between young people with high versus low CU traits, suggesting that study-level differences may explain the mixed findings in the literature.

The current review identified 13 studies from the 21 that included a control group and reported that internalising symptoms were higher in the CD group compared to typically developing children (Byrd et al., 2018; Colins & Andershed, 2015; Fanti, 2013; Jiang et al., 2021; Jiang et al., 2023; Loney et al., 2006; Pardini et al., 2012; Pauli et al., 2021; Rowe et al., 2010; Sebastian et al., 2016; Sethi et al., 2018; Vanwoerden et al., 2016; Viding et al.,

2012). These findings align with existing literature, indicating that children with conduct problems are at a higher risk of developing internalising symptoms than their peers in the general population (Fanti et al., 2019).

Moderators of the Effect

The moderator analysis indicated that participant setting significantly altered the difference in internalising symptoms between CU trait groups. Results showed the highest standardised mean difference of internalising symptoms between high and low CU trait groups was in community sample children. There was a small but significant positive effect when studies of this group were looked at alone. The wider literature reports that clinical and forensic samples disproportionately include young people with higher levels of conduct problems and CU traits who show more severe externalising behaviours (Craig et al., 2021). Craig and colleagues (2021) reported that young people in forensic and clinical settings encounter great difficulties, partly due to their complex and severe presentations (Sakai et al., 2017), which may highlight other factors that explain or predict internalising symptoms more accurately than CU traits. The lower levels of CU traits associated with reduced risk of internalising symptoms in community samples may be linked to the severity of conduct problems manifested in these cohorts (Fontaine et al., 2011; Rowe et al., 2010). It is conceivable that children with low CU traits experiencing fewer internalising symptoms may exhibit specific, less severe conduct problems rather than broader pathological difficulties. Further research is needed to understand more about what explains internalising problems in clinical and forensic groups.

In the present review, the sex balance across studies was not a significant moderator for the estimates of anxiety, depression, or combined symptoms. However, the existing literature has indicated sex-specific effects in the relationship between CU traits and

internalising symptoms. Notably, research by Essau et al. (2006) has suggested that CU traits are associated with lower levels of anxiety in males but not females. Similarly, Isen et al. (2010) observed a negative correlation between males' manipulative/deceitful psychopathic traits and internalising issues, but not in females and callous/disinhibited behavioural traits positively correlated with internalising problems in both girls and boys. The heightened comorbidity of internalising disorders among females may increase their susceptibility to a range of adverse outcomes (Dishion, 2000). While sex-specific patterns have been noted in previous research regarding the relationship between CU traits and internalising symptoms, this meta-analysis did not detect significant sex differences in the context of anxiety, depression, or combined symptoms. Due to the limited number of studies, including female-only samples (k = 4), further exploration of sex-related factors in the association between CU traits and internalising problems is warranted to better understand the interplay between these variables.

Furthermore, the current review did not find CU traits and internalising symptom informant significant moderators in the relationship between CU traits and internalising symptoms. Squillaci and Benoit (2021) proposed that the discrepancies in the relationship may be attributed to the difficulties in assessing internalised disorders and the unreliability of self-report assessments by young people (Levy et al., 2017). Only four out of 18 studies used multiple informants to measure internalising symptoms. Self-report measures completed by young people have the benefit of gaining insight into covert behaviours, emotions and subjective traits associated with psychopathy (e.g. lack of empathy and remorselessness), which might not be evidence to external observers (Andershed et al., 2002; Essau et al., 2006). Additionally, despite APA's (2013) recommendation to use multiple informants in assessing CU traits, only seven out of 18 studies used multiple informants. Nonetheless, the

current review did not find a significant impact of measurements of CU trait and internalising symptoms on the estimate of anxiety and depression in high and low CU trait groups.

The Possibility of a Non-Linear Effect

This meta-analysis examined whether high versus low CU traits explain variance in internalising difficulties in young people with CD and the linear correlation between CU traits and internalising symptoms. Currently, only this data is sufficient to support a meta-analytic approach. However, emerging evidence suggests a possible non-linear relationship between CU traits and internalising symptoms. Research suggests that the relationship between CU traits and internalising problems may depend on the CU trait *manifestation* (Goulter et al., 2023).

Karpman (1941) identified two different variations of people with high CU traits: the primary and secondary variants. Different etiological processes have been argued to underline the development of the different variants of high CU traits. Specifically, the primary variant is explained by an inherent or temperamental factor, while the secondary group is in response to environmental adversity, such as traumatic experiences (Cleckley, 1941; Kimonis et al., 2013). Children with the primary variant may experience a lack of anxiety, while the secondary variant has been associated with higher levels of depression and anxiety (Craig et al., 2021; Eisenbarth et al., 2016). Exposure to trauma places young people at risk for heightened emotional reactivity and hyperarousal (Cicchetti, 2016), which disrupts their ability to process distressing emotions and impairs conscious development (Kimonis et al., 2008; Kochanska et al., 2004). The reduction of emotional distress reinforces the suppression of empathy, functioning as a defence against further adversity (Bennet & Kerig, 2014; Lansford et al., 2006).

Another possible explanation for the lack of a consistent difference in internalising symptoms between children with CD with high and low CU traits (Fontaine et al., 2011; Rowe et al., 2010) is that the relationship might be more complex. Both high and low levels of CU traits may be associated with low levels of internalising symptoms, but for different reasons: high CU traits are linked to a lack of empathy (Fanti et al., 2018; Frick et al., 2014a) and reduced anxiety and depression (Frick et al., 1999), while low or normative levels of CU traits are associated with better social functioning (Milone et al., 2019) and similarly low anxiety and depression (Bansal et al., 2023). Further studies are needed to investigate whether moderate levels of CU traits may be better predictors of internalising symptoms, suggesting a non-linear relationship between the severity of CU traits and internalising symptoms.

Clinical Implications

Current treatments for children with CD focus on parent training as the first line of treatment (Scott, 2008). Behavioural parent training is the most thoroughly researched treatment for children's conduct problems, with substantial empirical evidence supporting its effectiveness (Weisz et al., 2004). According to the American Psychological Association criteria, several programmes are considered well-established due to multiple randomised trials (Patterson et al., 1982; Webster-Stratton et al., 2001) and subsequent replications by independent research teams (Scott et al., 2001). Randomised trials have demonstrated the effectiveness of the Triple P programme (Bor et al., 2002; Sanders et al., 2000), and there is also independent replication evidencing the Parent-Child Interaction Therapy model (Nixon et al., 2003). These studies indicate that behavioural parent training results in a short-term decrease in antisocial behaviour. Follow-up research show that these effects can last up to six years after intervention (Hood & Eyberg, 2003; Reid et al., 2003).

Some researchers have suggested that treatments for conduct problems may be less effective for young people with co-occurring high CU traits (Oxford et al., 2003). This is because many established treatments, such as parenting interventions designed to reduce coercive and inconsistent parents and use punishment and consequences, have less influence on the development of conduct problems in those with high CU traits (Oxford et al., 2003). However, a systematic review found that the evidence regarding the moderating effect of co-occurring high CU traits on the efficacy of CD interventions is inconsistent (Wilkinson et al., 2016). Additionally, only a small number of the studies reviewed were randomised controlled trials with a control group, leaving it uncertain how youth with high CU traits would have progressed without intervention. Nonetheless, given that high CU traits might reduce the effectiveness of some interventions for conduct problems, it is crucial to find specific targets for intervention that work well for these children. Researchers suggest that treatments could be more successful for children with high CU traits if they are started early and/or tailored to the individual child's needs (Hyde et al., 2013).

There is limited evidence examining whether CU traits reduce the effectiveness of empirically supported interventions for internalising symptoms. Donohue et al., (2021) suggest that children with elevated CU traits show lower responsiveness to interventions for depression or anxiety. This suggests that the risk factors for these disorders in children with high CU traits may differ from those in children with low CU traits. Therefore, different mechanisms might need to be addressed, for example, while many evidence-based interventions for anxiety and depression focus on enhancing children's abilities to identify, express, and self-regulate, treatments for children with high CU traits may also need to improve their understanding of others' emotions. Understanding whether young people with high CU traits are as responsive to interventions for anxiety and depression could also

influence the timing of interventions, such as potentially addressing CU traits before targeting anxiety and depression (Donohue et al., 2021; Kimonis et al., 2019).

Limitations

The results of this review should be interpreted considering the following limitations. Firstly, this review is impacted by the limitations within the CD and CU traits literature. The finding that there is no differential experience of internalising symptoms between conduct-disordered children with high and low CU traits may be constrained by the scarcity of literature available on the topic. This led to difficulties in analysing the potential moderating effect of the severity of conduct problems on the relationship between CU traits and internalising symptoms. As previously discussed, the level of conduct problems may impact the presentation of internalising symptoms in people with CU traits (Frick et al., 1999; Pardini et al., 2012; Robertson, 2021; Rowe et al., 2010; Walker et al., 1992). For example, in Pardini et al.'s (2012) study, among girls with low to moderate conduct problems, higher CU traits predicted higher depression scores. Conversely, in girls with moderate to high conduct problems, higher CU traits predicted lower anxiety scores. Despite the current review focusing on severe conduct problems and those diagnosed with CD, sample types (i.e., community, clinic or forensic) varied across the studies. The differences in sample type across studies may reflect the differences in the severity of conduct problems and CU traits. Clinic-referred patients and juvenile offenders have been found to have elevated levels of conduct problems and CU traits and exhibit more severe externalising behaviours than community samples (Craig et al., 2021). Limited number of studies within this review reported data on their use of conduct problem scale, which meant that a meta-regression, controlling for the severity of conduct problems, to assess whether this factor moderated the relationship

between CU traits and internalising symptoms was not feasible. The absence of this analysis potentially limits the depth of our findings and the robustness of our conclusions.

Secondly, the studies reviewed presented limitations due to the risk of bias, particularly in selection bias. Eight studies were rated as either unclear or high risk for selection bias. These studies lacked sufficient information about their recruitment strategies or recruited participants solely from a single service, indicating a reliance on convenience sampling. This approach risks overrepresenting or underrepresenting certain groups (Emerson, 2021), thereby biasing estimates of internalising symptoms. Subgroup analysis revealed significant differences in internalising symptoms between studies rated as low risk and those rated as having any risk for selection bias. This indicates that the level of selection bias in the studies influenced the observed internalising outcomes.

Thirdly, this meta-analysis included data from the same participants multiple times in different outcome subgroups (e.g., Bansal et al., 2023). Repeating samples could have a number of impacts. Firstly, it could reduce the confidence interval in the overall effect; however, this concern is not notable here where a non-significant effect was observed. Secondly, it may reduce the likelihood of detecting an effect of outcome type. However, the analyses for the separate outcomes (i.e., anxiety, depression and combined anxiety and depression) were conducted without repeating samples. To address this limitation, sensitivity analyses were conducted to include each sample once (Appendix 2) and the results indicated that this adjustment did not affect the overall conclusions.

Lastly, the underrepresentation of females in the studies included in the review limits the generalisability of the findings, given that there is evidence of sex differences in the experience of internalising symptoms in children with CD and CU traits (Fanti et al., 2013; Pardini et al., 2012). Nonetheless, this meta-analytic review employed a thorough search

strategy and accounted for potential confounding factors. Statistical analysis indicated that potential biases arising from small study effects or publication biases did not impact our findings.

Future Directions

The heterogeneity between studies in this review is expected, given the absence of a standard method for assessing CU traits or internalising symptoms in children. It is debated whether establishing a consensus on a standardised measure for CU traits or a subset of items would greatly enhance the comparability of future research findings (Sakki et al., 2023). Additionally, future studies would benefit from incorporating input from multiple sources (i.e., self-reports, carers, and teachers) when assessing CU traits and internalising symptoms, which can help mitigate shared method variance and provide a more comprehensive understanding of these constructs as perceived by different observers (Sakki et al., 2032). A question relating to how the severity of conduct problems may moderate the relationship between CU traits and internalising symptoms would be helpful to explore further. Lastly, investigating the impact of CU traits on emotion recognition in youth with CD holds significant promise (Baker et al., 2015; Frick et al., 2014a; Frick et al., 2014b). Callous-unemotional traits, affecting approximately 25-30% of youth with severe behavioural issues (Kahn et al., 2013), have been linked to notable deficits in emotion recognition, particularly in responding to fear and exhibiting low tolerance to frustration (Baker et al., 2015; Frick et al., 2014a; Frick et al., 2014b). Building upon prior research, future studies could further elucidate how children and adolescents with high CU traits differ in processing emotional stimuli compared to those with CD and low CU traits. Such investigations can deepen our understanding of the underlying mechanisms that may be impacting how young people with high CU process emotions such as anxiety and depression.

Conclusions

This meta-analysis found no significant differences in internalising symptoms between high and low CU trait groups in young people with CD. This was consistent across anxiety, depression, and combined anxiety and depression. These findings suggest that CU traits alone may not help predict internalising symptoms. Furthermore, subgroup analysis showed that in community samples, there was a small but significant positive effect of high CU traits on internalising symptoms. Using a standard measure for conduct problems would facilitate meta-regression analyses to assess whether conduct problems moderate the association between CU traits and internalising symptoms in young people. From a clinical perspective, the current results suggest that young people with CU traits may need targeted interventions regardless of whether they present with high or low CU traits.

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Chapter 2: The Impact of Mood on Children's Egocentrism

Abstract

Background: Theory of mind (ToM) is the ability to attribute mental states to others. Egocentric bias occurs when one's own knowledge interferes with the judgement of another's mental state. Happy adults have been shown to exhibit increased egocentricity. This study extends this to children by investigating how happiness influences their degree of egocentric bias and contributes to understanding the underlying processes of ToM in children.

Methods: Eighty-seven children were exposed to either happy or neutral mood conditions and completed a continuous false belief task. Mood ratings were taken before and after manipulation.

Results: A mixed design ANOVA revealed a significant effect of false belief on bias, but the effect of mood on bias was not significant, and there was no significant difference in the interaction between belief type and mood condition. The lack of a successful mood manipulation explained these findings. A Spearman's correlation between egocentric bias and mood scores after induction showed a moderate positive correlation.

Conclusions: The current study indicated higher self-reported happiness predicted increased egocentric bias in judgments, consistent with findings observed in adults. Overall, these results contribute to the two-step model of ToM, where happier children are more prone to interference from readily accessible defaults, whilst less happy children demonstrate more effortful ToM reasoning.

Introduction

Social interaction is intrinsic to human existence. An essential aspect of understanding social interactions relies upon predicting the behaviours, thoughts, and emotions of others, an ability known as theory of mind (ToM; Baron-Cohen et al., 1985; Premack & Woodruff, 1978). One impediment to successful ToM is egocentrism, which, in its broadest sense, refers to the interference of one's existing knowledge when making inferences about others' perspectives (Fishbein et al., 1972; Flavell et al., 1981; Liben, 1978; Piaget & Inhelder, 1956). This interference results in prioritising one's viewpoint at the expense of accurately understanding those of others (Flavell et al., 1981). Research has focused on the mechanisms underlying this phenomenon and factors that increase the likelihood of egocentric bias (see Todd & Tamir, 2024, for a review). The effect of mood on egocentric bias is a topic of interest, given that we engage in mental state inferences amidst a broad spectrum of affective states. The aim of this study was to investigate how mood impacts egocentric bias in children.

Accounts of Egocentrism

Egocentrism persists throughout a person’s lifespan and is not a static phenomenon, but one that varies with age (Bernstein et al., 2004; Bernstein et al., 2011a). Even adults, who might be expected to have developed a more nuanced understanding of others, show egocentric biases (Bernstein et al., 2011a; Bernstein et al., 2011b). These biases are exhibited in known tendencies, such as overestimating the degree to which others share their attitudes and emotions (Krueger & Clement, 1994; Ross et al., 1977), believing that others possess greater insight into their internal states than they do (Gilovich et al., 1998), and using their own information as a reference for assessing other people's information (Keysar, 1994).

There are at least two distinct explanations for the occurrence of egocentrism. Both the anchoring-and-adjustment model (Epley et al., 2004; Nickerson, 1999; Tversky & Kahneman, 1974) and the calculation-and-selection model (Leslie et al., 2004; Qureshi et al., 2010) propose that ToM begins with rapid and relatively efficient consideration of information. This information is then further processed before inferences about another's perspective are made. The anchoring-and-adjustment model suggests that the initial inference is anchored on self-information and then adjusted to differentiate between one's own and another's perspective. The model suggests that adjustment of the self-generated anchor requires deliberative attention (Epley & Gilovich, 2006; Gilbert, 2002); hence, factors that limit the use of attention should shorten adjustment, resulting in increased egocentric biases. The calculation-and-selection model, alternately, proposes that ToM begins with calculating potential mental states, which is a fast and cognitively efficient process. In contrast, selecting a perspective (i.e., one's own or another's perspective) requires executive resources to inhibit irrelevant mental states. Thus, both models suggest that factors that reduce the expenditure of cognitive resources required to select or adjust the initial information may result in increased egocentric bias (Qureshi & Monk, 2018).

Theory of Mind, Age and Executive Function

The development of explicit ToM abilities occurs by the ages 4 to 5 years, demonstrated by their ability to pass the classic false belief test (Gopnik & Slaughter, 1991; Wellman et al., 2001). In middle childhood (6 to 12 years), most children also pass more complex ToM tasks (Astington et al., 2002; Begeer et al., 2016); however, they still show biases and errors under time pressure (Lagattuta et al., 2014; Surtees & Apperly, 2012). Most evidence suggest that levels of egocentrism decrease from adolescence to young adulthood, then increases again from young adulthood to older adulthood, forming a U-shaped

developmental trajectory (Bernstein, 2021; De Lillo & Ferguson, 2023; Lagattuta et al., 2014; Riva et al., 2016).

According to selection and adjustment accounts, overriding an egocentric inference is limited by one's capacity to engage in effortful cognitive activity (Epley et al., 2004; Leslie et al., 2005). Changes in executive function abilities across the lifespan contribute to our understanding of the developmental trajectory of ToM. Cognitive functions such as attention, inhibitory control, and language predict the early development of ToM abilities (Derksen et al., 2018). As young people transition from childhood to adolescence, there is a notable progression in ToM abilities, which is essential for navigating the increasingly complex social interactions encountered during adolescence (Meinhardt-Injac & Meinhardt, 2020). Research comparing the same tasks performed by children and young adults found evidence of egocentrism in both age groups. Typically, egocentrism is more pronounced in children than adolescents and adults (Dumontheil et al., 2010), though this is not always the case (Apperly et al., 2011; Surtees & Apperly, 2012). The developmental trajectory of ToM mirrors the pattern of executive functioning development from childhood to young adulthood, and the decline in older age aligns with, and to some extent explains, the age-related differences observed in egocentrism (Aite et al., 2018; Diamond, 2013; Hoffman et al., 2015; Im-Bolter et al., 2016; Lagattuta et al., 2014; Surtees & Apperly, 2012). Age variations in the degree of egocentrism exhibited may be due to adults' enhanced ability to disregard interfering information, including their perspective (Perner, 1991; Wellman, 2014).

The Role of Mood in Effortful Cognitive Processes

The influence of mood on cognition has been widely researched in adults (Clark & Isen, 1982; Forgas, 2002; Forgas & Eich, 2013). Over the past few decades, an increasing body of research has indicated that adults in a positive mood tend to adopt a more superficial

and less effortful information-processing approach (Forgas, 2013, 2015). More specifically, they consistently demonstrate quicker decision-making, use less information, rely less on systematic and demanding cognitive processes, and are more confident in their decisions. In contrast, negative mood induced a more effortful, systematic, and analytic thinking style (Clark & Isen, 1982; Isen, 1984, 1987; Schwarz, 1990). Positive mood increases, and negative mood decreases the likelihood of relying on information one already knows rather than external information in cognitive tasks (Bless et al., 1992; Fiedler et al., 2003).

Following on from this logic and the accounts of egocentrism, Converse et al. (2008) proposed that if successful ToM requires effortful cognitive processing, then happy people should be more susceptible to making egocentric errors than sad people. They tested this hypothesis by inducing sad, neutral, and happy moods to investigate the impact on adults' degree of egocentric bias. Happy participants exhibited more egocentric bias than those in sad or neutral conditions. Converse and colleagues (2008) concluded that happy people are more likely to rely on their egocentric default. In contrast, neutral and sad people employ deliberate processing and therefore better consider the other agent's knowledge. This supported the claim that successful ToM requires effortful cognitive processing to correct the initial egocentric inference (Epley et al., 2004).

Though the impact of mood on egocentrism in adults is known, how happiness affects the degree of egocentric bias in children has yet to be studied. Two important questions emerge: First, does mood impact egocentrism in children similarly to adults (Converse et al., 2008)? Second, what insights does the relationship between mood and egocentrism in children offer regarding the underlying nature of the ToM processes? Building on previous findings which have highlighted variations in egocentric bias across age groups (e.g., Aite et al., 2018; Dumontheil et al., 2010), as well as the recognised influence of mood on cognitive

processes in adults (Converse et al., 2008; Forgas, 2017), this study aimed to increase understanding of how mood influences social understanding in children. Furthermore, it aimed to contribute to the expanding body of research examining how mood shapes the underlying mechanisms of ToM processing. Based on the literature, it was hypothesised that happier children would be more likely to exhibit a more significant degree of egocentric bias.

Method

Participants

Primary schools across Birmingham, United Kingdom were contacted to take part in the current study however only one school in an affluent area in Birmingham consented.. The inclusion criteria encompassed fluent English-speaking children, aged six-seven, who did not have a diagnosis of a neurodevelopmental condition (as reported by their teacher). Exclusion criteria were established for children with neurodevelopmental conditions, such as autism spectrum disorder (ASD) and intellectual disability, as these conditions have been shown to influence egocentric bias (Begeer et al., 2012). Ninety-five participants were invited to the study. Eight participants failed to complete the testing procedure instructions and were excluded from the analysis. After removing outliers (12 participants as described in analysis), the final sample included 40 males (53.3%) and 35 females (46.7%), aged 6 – 7 (M_{age} = 6.76. SD_{age} = 0.33).

There is an extensive body of literature on ToM in young children, particularly around the age of four, when they experience a significant shift in their ability to understand different perspectives (Beaudoin et al., 2020; Slaughter, 2020). Additionally, there is a growing body of research on ToM in adolescents and adults (Meinhardt-Injac et al., 2020). However, there is a relative paucity of research focusing on middle childhood. The initial design of this study

included children aged six to 10 years. However, due to time constraints in recruitment, the focus was narrowed to six-to-seven-year-olds which also offered a larger data point.

Procedure

Ethical approval was obtained through the University of Birmingham Ethics Committee, and the study was pre-registered with the Open Science Framework (see: https://osf.io/tbzx3). Written consent was obtained from the school's headteacher, and parents of the participating children were provided with detailed information about the study through an information sheet. Parents could opt out of their child's participation if they wished. Assent was also obtained from the children. Participants were provided a brief explanation of the testing procedure before starting the experiment.

Mood Manipulation

The mood manipulation check, adapted from Davis et al. (2017), used a 4-point Likert scale, ranging from neutral (1) to very happy (4). Participants were introduced to the scale and instructed to rate their mood before and after the mood induction. Prior research (Kassam & Mendes, 2013) has suggested that prompting individuals to report their mood may influence their emotional response. It was essential to assess participants' baseline mood levels as a point of comparison in evaluating the effectiveness of the mood manipulation. Participants assigned to the happy condition were shown a video of "The Bare Necessities" (from Disney, The Jungle Book), lasting 2.54 minutes. Participants in the neutral condition viewed a clip from the documentary "Our Planet, Forests," lasting 3 minutes.

The Bare Necessities and nature documentary video clips were selected due to their developmental appropriateness for the participants and their effectiveness in inducing the target mood (Lenton et al., 2013; Potts et al., 1984; Vincent et al., 2011; von Leupold et al., 2007). Video clips have been used to induce mood in several studies (Brenner & Salovey,

1992; Forgas et al., 1988; Kebeck & Lohaus, 1986; Potts et al., 1984). In these studies, children watched segments from well-known children's films or television shows. Potts et al. (1984) used children's television shows to induce happy and sad moods and a nature documentary to induce neutral mood. While most studies have used videos lasting four to six minutes, some have used clips as short as 2.5 minutes (Kebeck & Lohaus, 1986). Regardless of video duration, the predicted moods were successfully induced in all the studies cited.

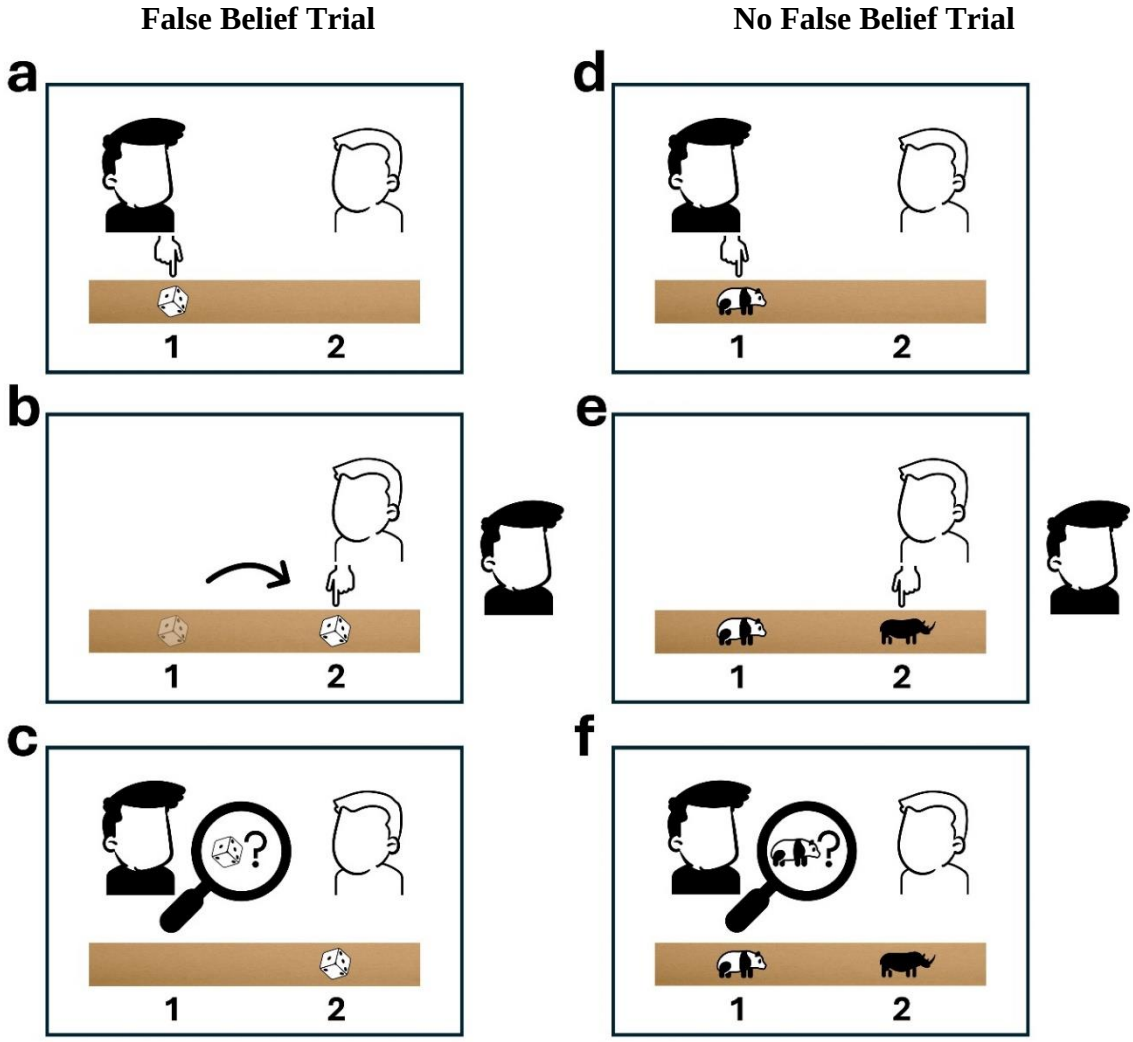
The Sandbox Task

The Sandbox task has been widely used as a continuous measure of false-belief reasoning in people across the lifespan due to its ecological validity (Sommerville et al., 2013). Participants were presented with a version of the Sandbox task (Bernstein et al., 2011a), in which a rectangular cardboard box measuring 140 cm in length, 20 cm in width and 19 cm in depth, was filled with packing peanuts to 2.5 cm below the top lip. Participants sat midway along and in front of the Sandbox while the experimenter sat opposite them behind the Sandbox. A tape measure and colour-coded stickers denoting hiding spots for all trials were on the experimenter's side (not visible to the participants). There were two within-participant conditions representing belief type: Each participant completed eight trials in a fixed order of alternating false belief (FB) (1, 3, 5, 7) and no false belief (NFB) (2, 4, 6, 8) trials. The experimenter narrated a story in each trial and placed objects inside the Sandbox while participants observed. In FB trials, the protagonist hid an object (in Location 1). Another character would move the same object in the protagonist's absence (Location 2). In NFB trials, a different object would be placed in the new location (Location 2). Participants were then asked to predict where the protagonist would search for the object upon returning. Figure 2.1 shows this schematically with an example of a FB and NFB trial.

An example of the FB trial is as follows: “Max and his brother are playing in the Sandbox. Max hides a die here (the experimenter hides dice at Location 1) and then goes away. While Max is gone, his brother decides to move the dice here (Location 2)”. In the NFB trial, participants were told: “Luke and his brother are playing in the Sandbox. Luke hides a toy panda here (Location 1) and then goes away. While Luke is gone, his brother puts a toy rhino here (Location 2)”. Participants in both trials were then asked, “When Max/Luke comes back, where will he look for the die/panda?”. The specific scenarios varied for each trial, with different characters, objects, and hiding locations. In all trials, there was a 36 cm distance between the first and second hiding locations. After hiding each object, the experimenter levelled the packing peanuts to prevent participants from using surface cues to guide their search estimates. It is also worth noting that the size of the objects were appropriately sized with respect to the precision of the measurements recorded. In both FB and NFB trials, the experimenter varied the direction of movement for the second located object, either to the right or left of the first object. This approach aimed to prevent any inherent negative or positive bias for the belief-type trials. Responses were recorded covertly and stored in a database. The total duration to complete the Sandbox task was 10-15 minutes.

Figure 2.1

Schematic Example of a False Belief and No False Belief Trial



Note. Where: a-c illustrates a false belief trial showing protagonist's initial burial (a), second character's alteration of the object's location (b) and question posed to participant upon protagonist's return regarding where they think the protagonist will look for the object (c); and d-f illustrates a no false belief trial showing burial of the first object (d), second character's burial of another object in the absence of the protagonist (e) and question posed as in c regarding where they think the protagonist will look for the first object (f). Participants from both happy and neutral mood conditions completed equal numbers of FB and NFB tasks. The die is shown as translucent to indicate its previous location.

Bias Scores

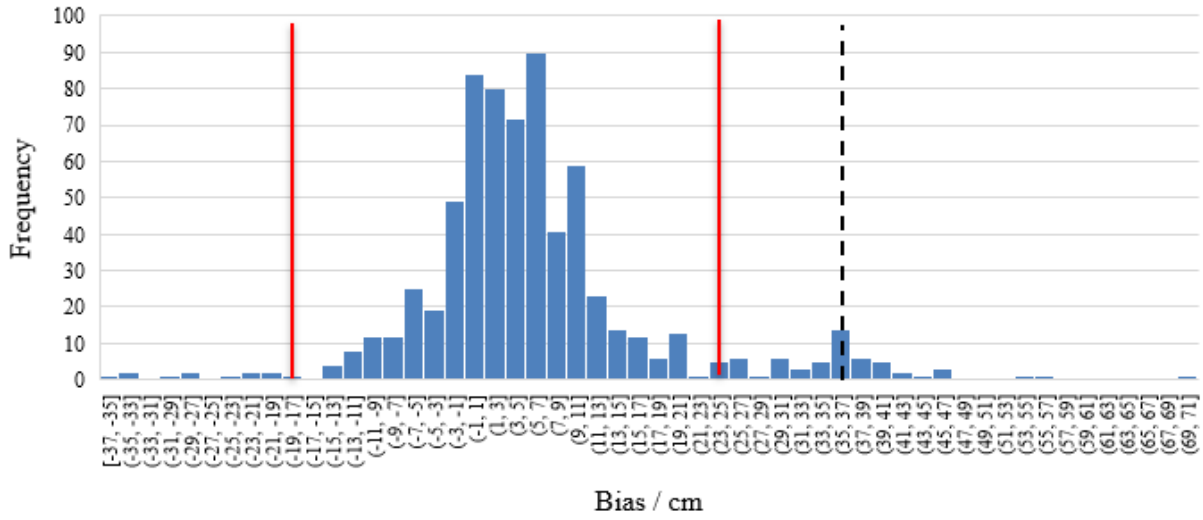
Bias scores were calculated for each trial by computing the distance between the search response and Location 1 (where the protagonist hid the object). Following this, responses towards Location 2 were then assigned positive values, and responses away from the second location were assigned negative values. Therefore, Location 2 need not always be in the same direction relative to Location 1. Under this protocol, zero bias always indicates the correct location response.

The delta mean bias was calculated for each participant and given by the difference between the FB and NFB mean biases (i.e., FB mean bias – NFB mean bias). This calculation allows for determining the extent to which participants' biases deviate from their baseline biases (Begeer et al., 2012). In essence, the delta mean bias represents the shift in participant bias relative to when they are not required to hold a false belief perspective.

The distribution of bias scores from all trials (Figure 2.2) was plotted to identify an appropriate method of removing outliers. This plot determined bias cutoffs beyond which a response is excluded. Exclusion zones of ≥24 cm and ≤ −18 cm were chosen to exclude responses likely to denote the incorrect location (i.e., Location 2) and generally anomalous responses (e.g. where the participant has wholly forgotten/guessed, did not understand the task or was not motivated to respond rationally). Figure 2.2 shows red lines corresponding to both cutoffs (BIAS = −18, 24 cm) and a black dashed line corresponding to Location 2 (BIAS = 36 cm). Participants who yielded exclusionary responses (i.e., responses within the exclusion zones) in at least two of the FB or NFB trials were excluded from further analysis due to insufficient data points for calculating meaningful means (i.e., a minimum of three data points to calculate a mean).

Figure 2.2

Histogram of the Biases Across all Trials



Note. Where red lines indicate inclusive bias cutoffs for omitting responses (−18 cm and 24 cm) and black dashed line indicates Location 2 (Bias = 36 cm)

Results

Mood Manipulation

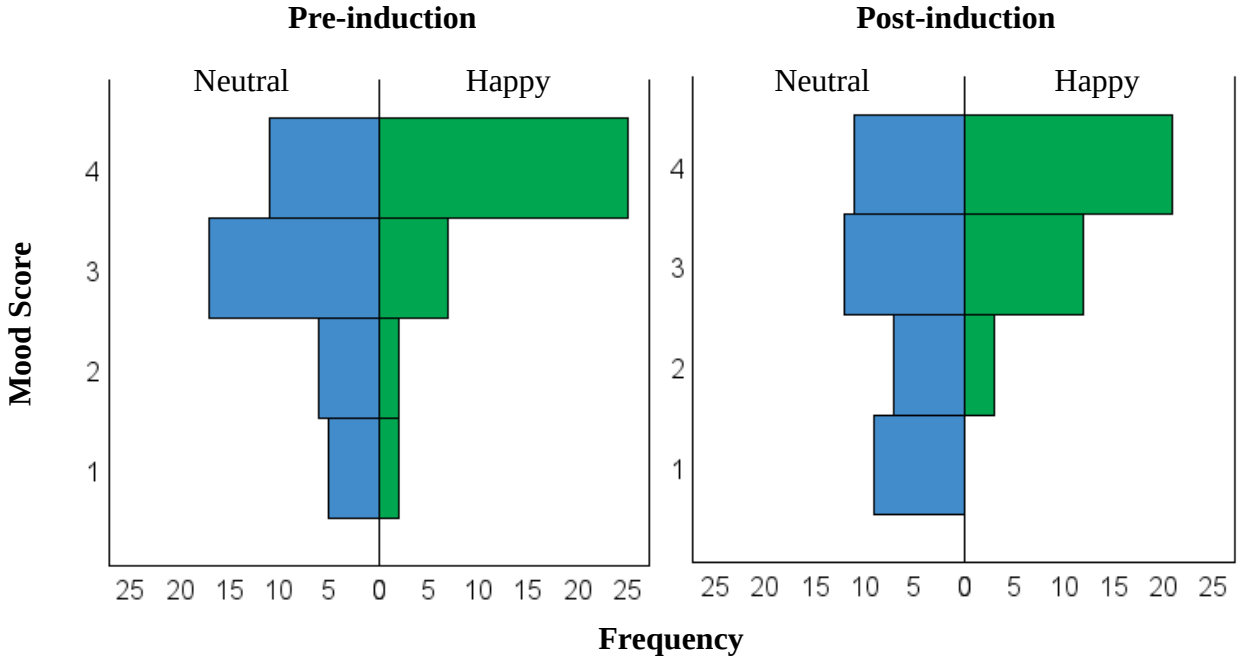
To evaluate the impact of the video exposure on children's mood states, a series of analyses were conducted. The planned analysis was to compare post-induction scores as evidence of the effectiveness of the induction and compare pre-induction scores to check for unintended differences between groups as a result of pseudo-random assignment. As the mood scores did not meet the assumptions of normality required for parametric tests, Mann-Whitney-U tests were performed to evaluate whether post-induction mood scores differed by mood induction. The results showed that happy participants had significantly higher mood scores (N = 36, M = 3.50, SD = 0.65) than neutral participants (N = 39, M = 2.64, SD = 1.12), after induction (U = 399, Z = −3.41, p < .001, Figure 2.3). Although pseudo-randomly assigned, participants assigned to the happy group had a higher self-reported pre-induction

mean mood score (M = 3.53, SD = 0.83) than children assigned to the neutral video (M = 2.87, SD = 0.97), (U = 386, Z = −3.63, p < .001, Figure 2.3). Under this analysis it was therefore inconclusive whether the mood induction had the intended effect.

In light of this, a 2 (Mood scores: Pre-and-Post Induction) X 2 (Mood induction: Happy, Neutral) mixed analysis of variance (ANOVA) was conducted. Despite mood scores being a discrete metric, an ANOVA was deemed appropriate due to its robustness against violations of the normality assumption (Blanca et al., 2017). The analysis did not find a significant effect between pre- and post-induction mood scores, $F(1, 73) = 1.09$; $p = 0.30$; $\eta_p^2 = 0.02$, and did not find a significant interaction between pre-and-post mood scores and mood manipulation video, $F(1, 73) = 0.67$; $p = 0.42$; $\eta_p^2 = 0.01$, however there was a significant effect of mood manipulation video, $F(1, 73) = 18.81$; $p < .001$; $\eta_p^2 = 0.21$. This suggests that participants who saw the happy video were happier, on average, both before and after the video and the difference from the neutral group did not change.

Figure 2.3

Histogram of Mood Scores Pre- and Post-Mood Induction for the Neutral and Happy Groups



Egocentric Bias and Mood

It was predicted that participants in the happy condition would exhibit increased bias in the false belief task (i.e., be more influenced by their privileged location knowledge when estimating the location where the protagonist would look for their object) than participants in the neutral condition. To investigate this, a 2 (Belief: False belief, No false belief) X 2 (Mood condition: Happy, Neutral) mixed design was used. An ANOVA revealed a significant effect of belief type on bias, $F(1, 73) = 31.89$; $p < .001$; $\eta_p^2 = 0.30$, but no significant effect of mood condition on bias, $F(1, 73) = 0.27$; $p = 0.61$; $\eta_p^2 = 0.004$. The interaction between belief type and mood condition was not significant, $F(1, 73) = 0.72$; $p = 0.40$; $\eta_p^2 = 0.01$ (see Table 2.1 for means and standard deviations).

Table 2.1

Mean Bias of Belief Trials for Happy and Neutral Mood Groups

	Belief Type	
Mood Video	False Belief	No False Belief
Happy	5.95 (2.55)	2.79 (3.80)
Neutral	5.27 (2.97)	2.94 (2.95)

Note. Standard Deviation in Parentheses

Correlation Between Mood and Bias

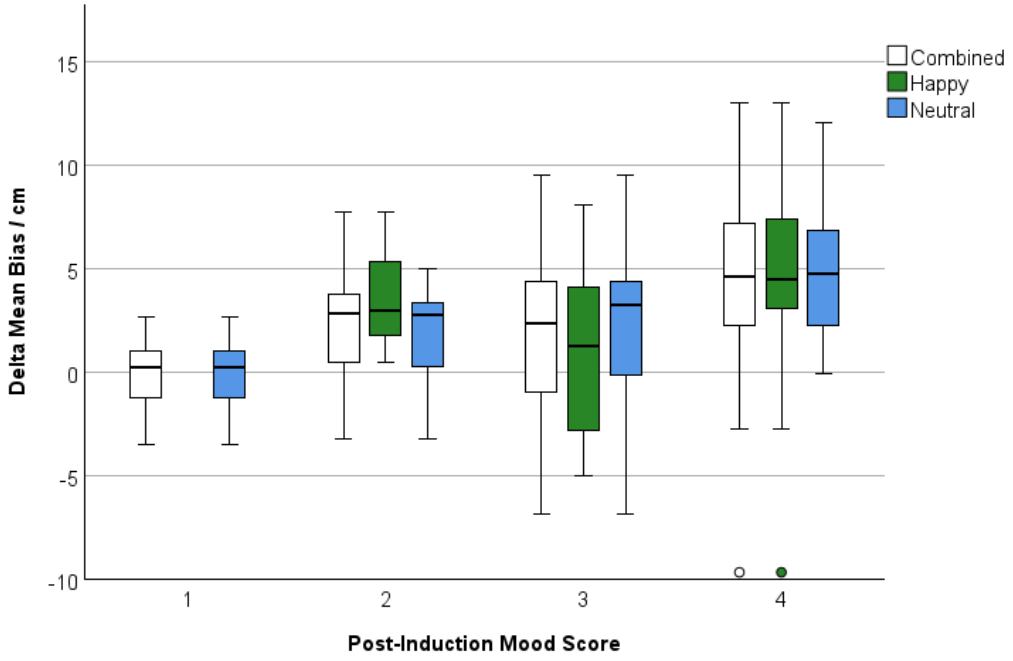
The group analysis using mood manipulation presented in the previous section suggests that mood condition did not have a statistically significant impact on egocentric bias. However, given the mood differences between groups largely resulted from a difference in random assignment (as shown by differences in pre-induction mood ratings) rather than a successful induction, there was still a substantial amount of variability within groups (see Figure 2.3). An alternative and potentially more accurate measure of children's mood post-induction is their own self-rating of mood. For this reason, an exploratory analysis was conducted focussed on self-reported mood instead of mood induction group. For this, the

delta mean bias metric was used (i.e., FB mean bias − NFB mean bias) as a measure of individual egocentric bias (Bernstein et al., 2011). To test the likelihood that any effect was the result of state-level mood, rather than broader individual differences, an equivalent correlation was also conducted between pre-induction mood and egocentric bias.

This Spearman's correlation showed that, delta mean bias and mood scores post-induction was positively and significantly correlated, $r = .43$, $N = 75$, $p < .001$ (see Figure 2.4). The same correlation using pre-instead of post-induction however was not significantly correlated, $r = -.03$, $p = 0.39$, one-tailed (see Figure 2.5)

Figure 2.4

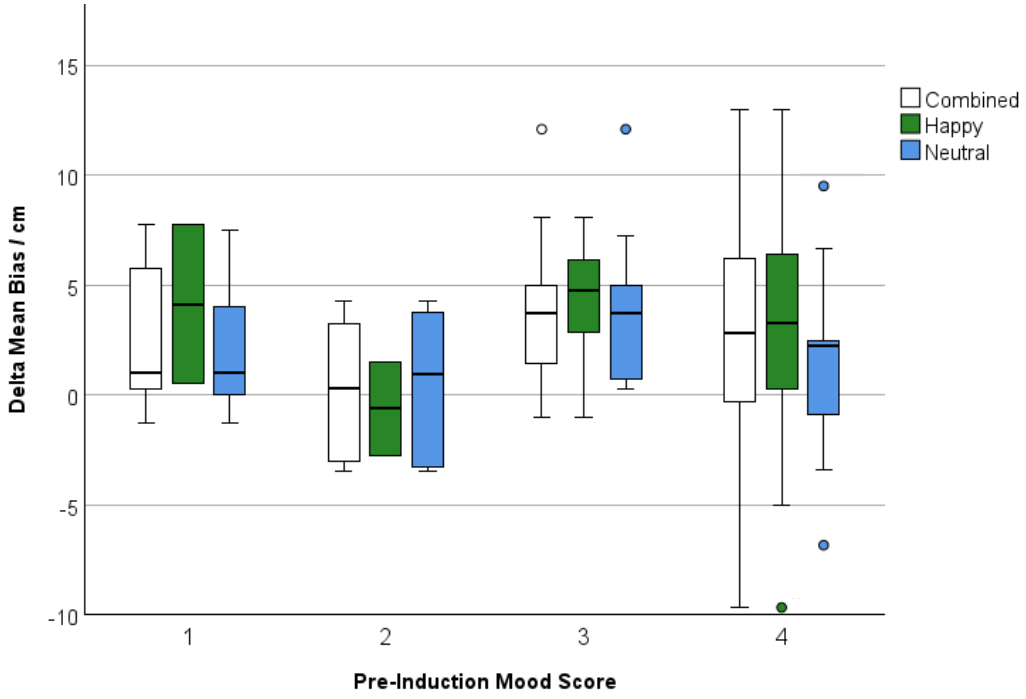
Box Plots of Delta Mean Bias versus Post-Induction Mood Scores



Note. Plot shows minimum, lower quartile, median, upper quartile and maximum. Outliers are shown as points and are assigned as such if 1.5*IQR (interquartile range) above and below the upper quartile and lower quartile, respectively.

Figure 2.5

A Box Plot of Delta Mean Bias and Pre-Induction Mood Scores



Note. Plot shows minimum, lower quartile, median, upper quartile and maximum. Outliers are shown as points and are assigned as such if 1.5*IQR (interquartile range) above and below the upper quartile and lower quartile, respectively.

Discussion

This study aimed to evaluate the effect of happiness on egocentric biases in six- to seven-year-old children. The Sandbox task successfully demonstrated egocentric biases in children's reasoning about characters' false beliefs. Short video clips were used to induce desired mood samples. Contrary to predictions, the mood manipulation failed to directly induce distinct mood groups in children capable of displaying a significant difference in the magnitude of their egocentric biases. However, independently of the manipulation, children's self-reported mood scores after induction and egocentric bias were positively correlated.

Egocentrism in Children's False Belief Reasoning

Using the Sandbox task, six-to-seven-year-olds were biased by their own knowledge regarding the current location of an object when asked to predict where a protagonist, who does not possess the same knowledge, would search for it. Essentially, the children's judgement of the protagonist's belief was biased by their own knowledge of the actual location. Children did not show the same performance pattern in the control condition (without false beliefs), indicating that cognitive demands alone did not explain the heightened bias in false belief trials. This study replicated the findings originally documented in the Sandbox task by Sommerville et al. (2013). It corroborates the notion that despite grasping the representational nature of beliefs, children aged six to seven remain susceptible to significant contamination of their estimates regarding another individual's beliefs by their own knowledge. This observation aligns with previous research, such as the work conducted by Bernstein & Hugenberg (2007), further emphasising the persistent influence of personal knowledge on assessments of others' beliefs across various tasks and contexts.

These findings provide theoretical insights into the mechanisms involved in inferring mental states. Particularly, the observed greater bias in the false belief task compared to the no false belief task suggests that effective ToM operation necessitates cognitive effort to modify the default egocentric estimate, which tends to be more readily accessible than the information held by others. This underscores the cognitive processing demands of successfully navigating social interactions and understanding others' perspectives (Epley et al., 2004; Leslie et al., 2004; Nickerson, 1999; Qureshi et al., 2010).

Are Happier Children More Egocentric?

Conflicting results were found regarding the potential impact of happiness on children's egocentrism. There was no difference between the magnitude of egocentric bias

between children who received the Happy induction and those who received the Neutral induction. However, self-reported mood scores after manipulation showed a moderate positive correlation with egocentric bias. These results are best understood within the context of the effectiveness of the mood manipulation, or lack thereof.

The findings for self-reported mood were clearer. Children who reported they were happier estimated that another person's belief regarding an object's location was closer to their knowledge of where the object actually was compared to those who were less happy. This suggests that as children's happiness increased, they became more egocentric, making them less accurate in taking another person's perspective. This relationship was not observed in the relationship with pre-induction mood, suggesting that their mood at the moment influenced performance rather than that more egocentric children tend towards happiness more generally. This finding aligns with Converse et al.'s (2008) results in adults and suggests a similar relationship between happiness and egocentric bias in children. The observation that happy mood increases egocentric bias in children and adults suggests that mood's impact on underlying cognitive mechanisms in ToM reasoning may be stable and function in a comparable manner throughout childhood and into adulthood. These insights contribute to understanding the relationship between mood and ToM ability in children. Such findings shed light on the underlying mechanisms of ToM reasoning and mood's impact on children's social cognition.

Positive mood has been found to decrease engagement in effortful cognitive processing (Forgas, 2015), thus increasing reliance on self-information and reducing the likelihood of processing external information (i.e., another's perspective). Consequently, this suggests that happy children engaged less in the necessary cognitive effort to adjust their initial egocentric default (self-information). This, in turn, resulted in increased egocentric bias

in their judgements. In other words, a happy mood hindered the effort required to overcome the "pull" towards self-information (Todd & Tamir, 2024).

Several studies in adults suggest that happiness can lead to less systematic cognitive processes. In one influential study, Isen and colleagues (1982) demonstrated that happy adults often use simplistic response strategies, leading to erroneous inferences. Specifically, happy people were found to produce biased judgments influenced by the availability heuristic (Tversky & Kahneman, 1974). The current study demonstrates that this effect is also found in children, specifically aged six-to-seven. In complex tasks with multiple dimensions and possible outcomes, a child in a happy mood might choose the first minimally acceptable solution based on a simple, low criterion (Simon, 1976) rather than optimising by taking into account other factors and outcomes. This pattern fits with the dual process theories (Chaiken & Trope, 1999; Greene et al., 2001; Stanovich, 1999) and suggests that happy children tend to take the first inference, that is, the egocentric inference, and fail at adjusting this to take another's perspective. Happy individuals generally respond faster but less accurately, suggesting a heuristic rather than a systematic approach (Isen & Means, 1983). This aligns with the observation that sudden increases in arousal reduce reaction times but raise error rates (Derryberry, 1988).

Clinical Implications

The current study highlights relationships between ToM-specific abilities and affective states which may have possible implications in clinical and therapeutic settings. Although a happy mood was found to increase egocentric bias in children in the current study, happiness is also associated with more efficient information processing (Bless et al., 1992; Fiedler et al., 2003), which has both helpful and unhelpful functions, depending on the context of the child's environment. Previous studies have demonstrated that inducing a

positive mood in children can be beneficial when tasks requiring creativity or flexibility are needed (Greene & Noice, 1988; Rader & Hughes, 2005; Schellenberg et al., 2007). Schnall et al. (2008) found that a happy mood impaired children's performance on tasks requiring attention to detail, which aligns with adult research. In adults, a positive mood enhances performance in creative tasks (Isen, 1987), while a sad mood improves performance on tasks requiring attention to detail (Gasper & Clore, 2002; Storbeck & Clore, 2005). Salovey et al. (1995) suggested that for mood to enhance creativity, one must have a clear understanding of their emotions. Essentially, positive emotions enable us to engage more deeply with new experiences, whereas negative emotions may foster more profound introspection and detailed thinking when exploring new ways to navigate these experiences (De Dreu et al., 2008; Verhaeghen et al., 2005). Therefore, a positive mood may be more suitable for generating ideas and divergent thinking, whereas a negative mood may be more effective for problem-solving and convergent thinking (Davis, 2009), which may be helpful to draw on in therapy (Gutterman & Aafjes Van-Doorn, 2022). This is not to suggest that clinicians should induce happy or sad moods in children during therapy. Rather, it emphasises that different moods activate different levels of information processing, which may be advantageous in various situations (Greene & Noice, 1988; Rader & Hughes, 2005; Schellenberg et al., 2007). Furthermore, based on the evidence that happiness promotes a faster, more efficient, and top-down processing style (Isen & Means, 1983), quick processing – potentially linked to creativity and flexibility (Isen, 1987), may allow people opportunities to recover from certain errors (Geary, 2010).

Strengths and Limitations

A strength of the current study is that the mood rating scale was sufficiently accurate to produce mood ratings consistent with the pattern of ToM performance. Read and Fine

(2005) argued that mood scales may be susceptible to children's tendency toward social desirability bias, wherein they may inaccurately report socially desirable traits to present themselves more favourably to researchers (Oerke & Bogner, 2013). Despite this concern, the scale still effectively captured the relationship between mood and ToM performance. Additionally, the scale used in the experiment allowed children with less-developed verbal and reading skills to communicate their mood ratings effectively (Brenner, 2000). This methodological choice ensured that mood assessment was accessible for all participants, thereby enhancing the validity of the study's findings.

The current findings should be interpreted while considering the limitations that suggest potential avenues for future research. The mood manipulation was unsuccessful as the groups had a substantial overlap in mood scores. Despite the support for nature documentaries in inducing neutral moods (Lenton et al., 2013; Potts et al., 1984; Vincent et al., 2011), many of the children in the current study reported feeling pleasant while watching the clip, and some reported that they had previously watched other episodes of the 'Our Planet' series. Future research should consider using different mood inductions, such as autobiographical recall tasks (Todd et al., 2015) or emotional stories (Hayes et al., 1987), to successfully induce mood.

Furthermore, because location one was the true location in both false belief and no false belief trials in the Sandbox task, it is possible that children may have learned this over subsequent trials, resulting in decreased bias scores. Bernstein et al. (2011) also used the Sandbox task in their experiment with older and middle-aged adults and found that bias scores did not decline over trials. The successful replication of the well-established experimental protocol highlights the reliability of the methodology, suggesting that potential learning effects do not significantly impact bias scores in the Sandbox task. Nevertheless, it remains

prudent for future research to randomise the locations of objects in both false belief and no false belief trials, ensuring that location one is not always the true location, to further mitigate any potential learning effects.

Another important aspect is the stability of the mood throughout the experiment. If mood was not broadly maintained throughout the duration of the experiment, one would expect the mood-sensitive biases to drift over time, e.g. the happy group bias would decrease with increasing trial number. Regression analysis showed that this is not the case which suggests the mood was stable throughout.

In no false belief trials, where the protagonist's beliefs align with reality, children still exhibit bias towards the location of the second, irrelevant object. Biases towards the second object's location may highlight other cognitive functions that underlie ToM processes, including attention, memory and executive function (Derksen et al., 2018; Ferguson et al., 2021). It would be interesting for future research to investigate whether the level of bias in no false belief tasks exhibited by children is observed in adults, and whether advancements in executive functioning in adults predicts less bias (Ferguson et al., 2021). Understanding these differences could provide insights into the development of ToM and the cognitive mechanisms that support it across different age groups.

Lastly, the current work focused on the effect of incidental happiness on the egocentric bias; future work should investigate whether integral happiness (i.e., happiness evoked by the other person; Bodenhausen, 1993) also impacts ToM reasoning (see Bukowski & Samson, 2016, on integral anger versus guilt).

Conclusions

In conclusion, there is now evidence to indicate that mood states significantly and often subconsciously affect both the extent of egocentric bias and the processes underlying

this phenomenon. Building upon prior research in adults that demonstrated how happiness increases egocentric bias during explicit reasoning about others' false beliefs (Converse et al., 2008), this study indicates higher self-reported happiness moderately correlates with increased egocentric bias in judgments, in children aged between six to seven. Overall, these findings indicate how happiness influences ToM use, with happier children more prone to interference from readily accessible defaults, while less happy children demonstrate more effortful ToM reasoning.

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Chapter 3: Press Releases

Meta-Analysis Press Release

Review reveals no relationship between callous-unemotional traits and anxiety and depression in youth with conduct disorder.

A recent comprehensive review has highlighted the intricate relationship between conduct disorder (CD) and internalising symptoms such as anxiety and depression in children and adolescents. Conduct disorder is diagnosed in children up to the age of 18 who show a persistent pattern of behaviour that involves violating social norms and the rights of others. These behavioural issues are widespread, with the estimated worldwide prevalence of CD being 2-4%. The review specifically focused on a subgroup of young individuals with CD who also exhibit callous-unemotional (CU) traits, characterised by a lack of empathy, remorse, and concern for others' feelings. This distinct subgroup displays more severe and enduring antisocial behaviours, adding complexity to the understanding of CD in young people.

The primary aim of the review was to investigate how the presence of high CU traits in conduct-disordered youth impacts their experiences of anxiety and depression. It has been suggested that the consequences of antisocial behaviours in children with CD can lead to their failures in social and education, increasing their likelihood of experiencing anxiety. However, less is known about how the presence of high CU traits impacts the likelihood of children with CD developing anxiety and depression. As children with CD and CU traits respond less to therapeutic interventions, gaining a deeper understanding of this group is crucial for developing more effective interventions.

The review included studies published from 1990 onwards, focusing on children and adolescents diagnosed with CD or exhibiting high conduct problems, alongside low or high

CU traits. The review included studies that examined the differences in anxiety and depression between individuals with high versus low CU traits, as well as correlational studies exploring the relationship between conduct disorder, CU traits, and anxiety and/or depression.

The review included 21 studies and found no statistically significant difference in anxiety and depression between those with high versus low CU traits nor a significant relationship between the factors. Unexpectedly, studies that looked at children in the community, found a small impact of high CU traits on increasing the likelihood of anxiety and depression developing. The findings indicate that sub-categorising young people with CD based solely on CU traits is not effective at predicting their levels of anxiety and depression.

The studies included in the review presented contradictory findings. Some suggested a positive relationship between CU traits and internalising symptoms, while others indicated a negative relationship or no difference at all. The findings of the review indicate that there is no overall difference in internalising symptoms between young people with high versus low CU traits.

The review suggests that the relationship between CU traits and anxiety and depression in children with CD is complicated. Both high and low levels of CU traits are associated with low levels of internalising symptoms, but for different reasons: high CU traits are linked to a lack of empathy and reduced anxiety and depression, while low CU traits are associated with better social functioning and similarly low anxiety and depression. Further studies are needed to investigate whether moderate levels of CU traits may be better indicators of anxiety and depression.

Further research is needed to explore how the severity of conduct problems may influence the relationship between CU traits and internalising symptoms. Investigating the impact of CU traits on emotion recognition in youth with CD holds significant promise, as

CU traits have been linked to notable deficits in emotion recognition, particularly in responding to fear and exhibiting low tolerance to frustration. Building upon prior research, future studies could further explain how children and adolescents with high CU traits differ in processing emotional information compared to those with CD and low CU traits. Such investigations can deepen our understanding of the underlying mechanisms that may be impacting how young people with high CU process emotions such as anxiety and depression.

The implications of this study are significant for clinicians working in the field of youth mental health. By identifying and addressing the unique needs of individuals with CD and CU traits, we can provide better support and resources to help them thrive. Clinicians should be mindful of the potential presence of comorbid emotional problems in children diagnosed with CD, regardless of whether high levels of CU traits are identified.

Empirical Press Release

New study reveals link between happy mood and difficulty in understanding others' perspectives.

In a recent study examining childhood development, researchers have uncovered a striking relationship between happiness and the ability to understand another's differing perspective. The study found a fascinating trend: the happier children are, the more challenging it becomes for them to grasp divergent perspectives. This finding contrasts with the commonly held belief that happiness is universally beneficial.

Understanding and interpreting the thoughts and beliefs of others, known as theory of mind (ToM), is crucial for social interaction. There are several factors that influence how well we can predict others' beliefs and perspectives, including age. For instance, toddlers struggle to understand that others can have different perspectives. However, by age four, children typically develop this critical ability. The ability in using ToM increases with age into adulthood, and then diminishes in older adulthood. Mood also plays a significant role; previous research has shown that happy adults tend to make more errors when taking another person's perspective compared to those in neutral or angry moods. In a world where many things can change our mood on an hourly or even minute basis, it is important to find out how it may impact our understanding of others. Until now, how mood impacts children's ToM was unknown. This study aimed to explore the effect of happiness versus a neutral mood on children's ability to understand others' perspectives.

The ability to predict what others are thinking or perceiving while sidestepping your own perspective requires mental effort. Certain mood states, such as anxiety and happiness, have been proposed to cause adults to expend less mental effort in this regard, leading to more errors in judgements.

Eighty-seven children completed the experiment. They were shown either a happy video or a video inducing a neutral mood. Subsequently, the children completed a task designed to measure their ability to ignore their own perspective while predicting what someone else was perceiving. The results revealed that happier children performed worse in making these predictions. This suggests that mood significantly influences the ability to understand others' perspectives, even in childhood.

This study provides valuable insights into the cognitive processes involved in predicting others' thoughts. A happy mood increases the likelihood of one's own knowledge interfering with predictions about other people's knowledge, creating greater difficulty in resisting the 'pull' of their own perspective, a phenomenon known as egocentric bias.

The findings may have clinical implications, contributing to understanding how mood disorders may alter cognitive mechanisms underlying ToM reasoning. Mood disorders such as depression and anxiety have been linked to deficits in cognitive functioning. Determining the specific mechanisms through which mood influences ToM reasoning in both typical and disordered mood states may contribute to the development of more targeted therapeutic approaches for people with mood disorders. This study provides a foundation for further research into how mood regulation can be leveraged to improve social cognition in children.

Appendices

Appendix 1: PRISM Checklist

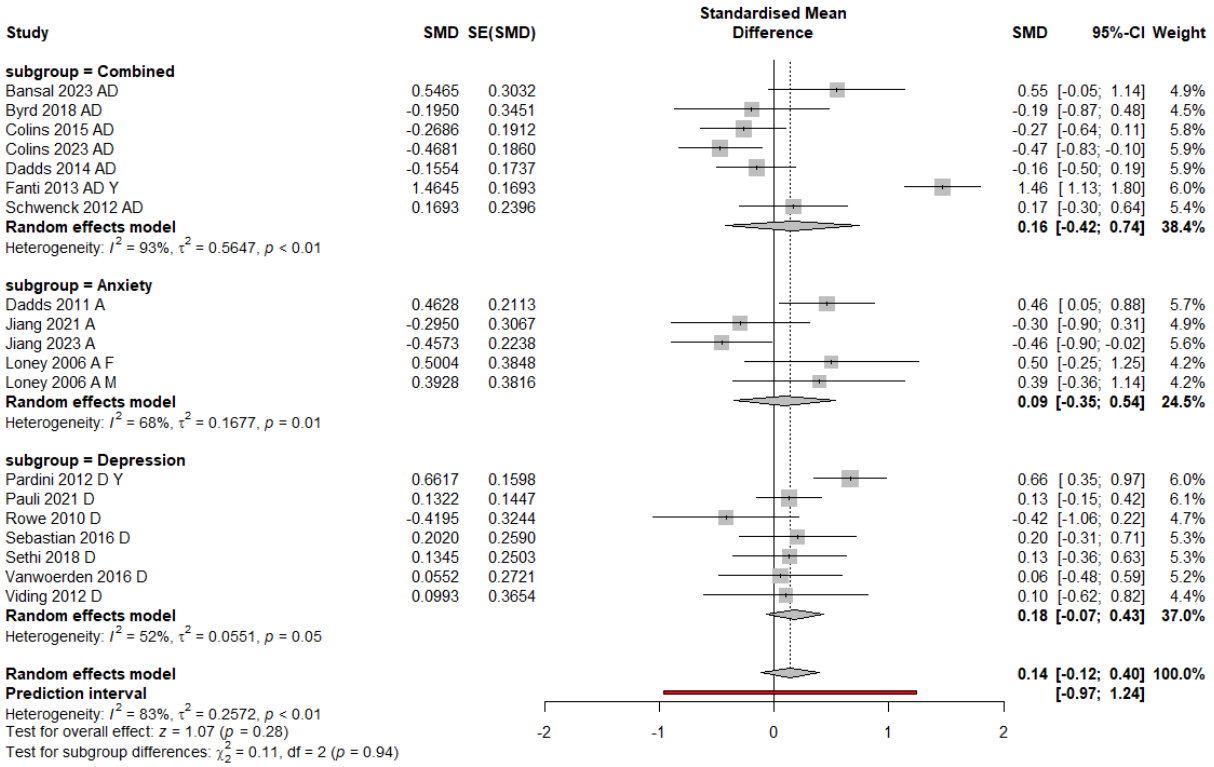
Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	7
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	7
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	7-9
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	9-10
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	10
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	11

Section and Topic	Item #	Checklist item	Location where item is reported
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	11
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	11
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	11
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	12-15
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	15-16
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	N/A
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	15-16
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	7-11

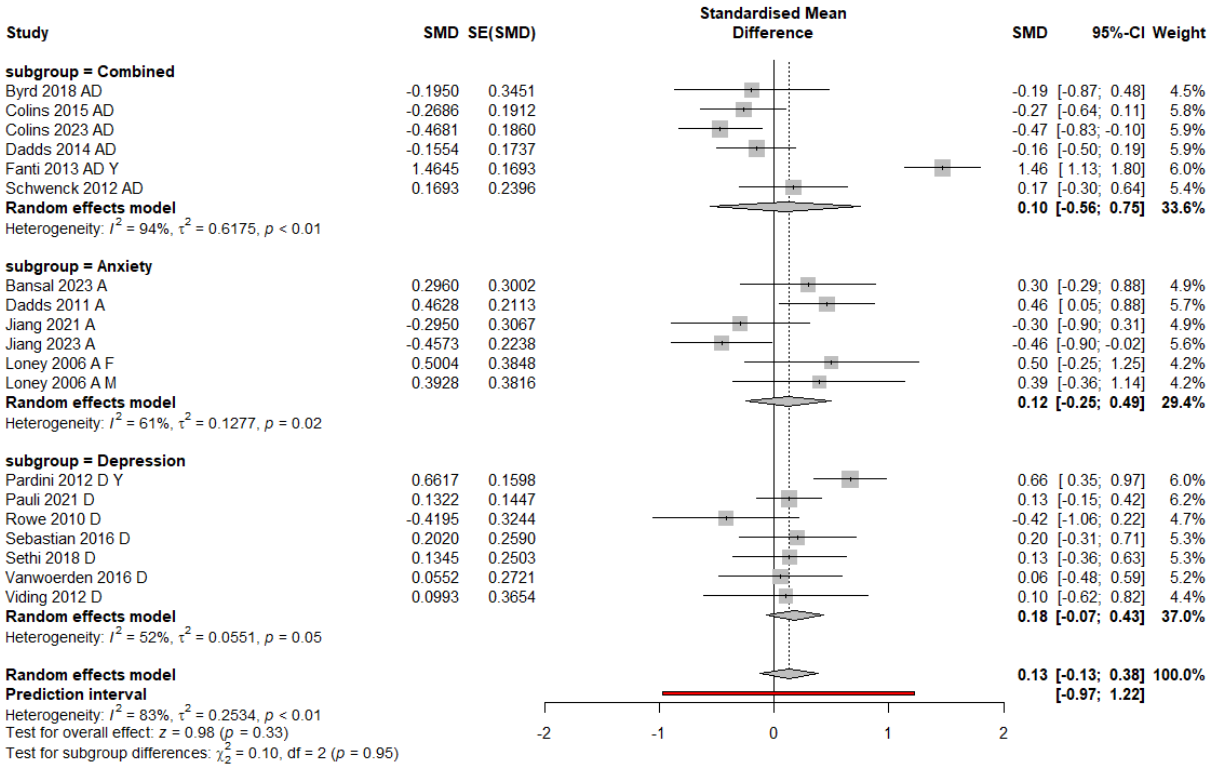
Section and Topic	Item #	Checklist item	Location where item is reported
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	16
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	12
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	18
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	18
Study characteristics	17	Cite each included study and present its characteristics.	20-24
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	25-29
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	32
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	34
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	32
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	32
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Appendix 2

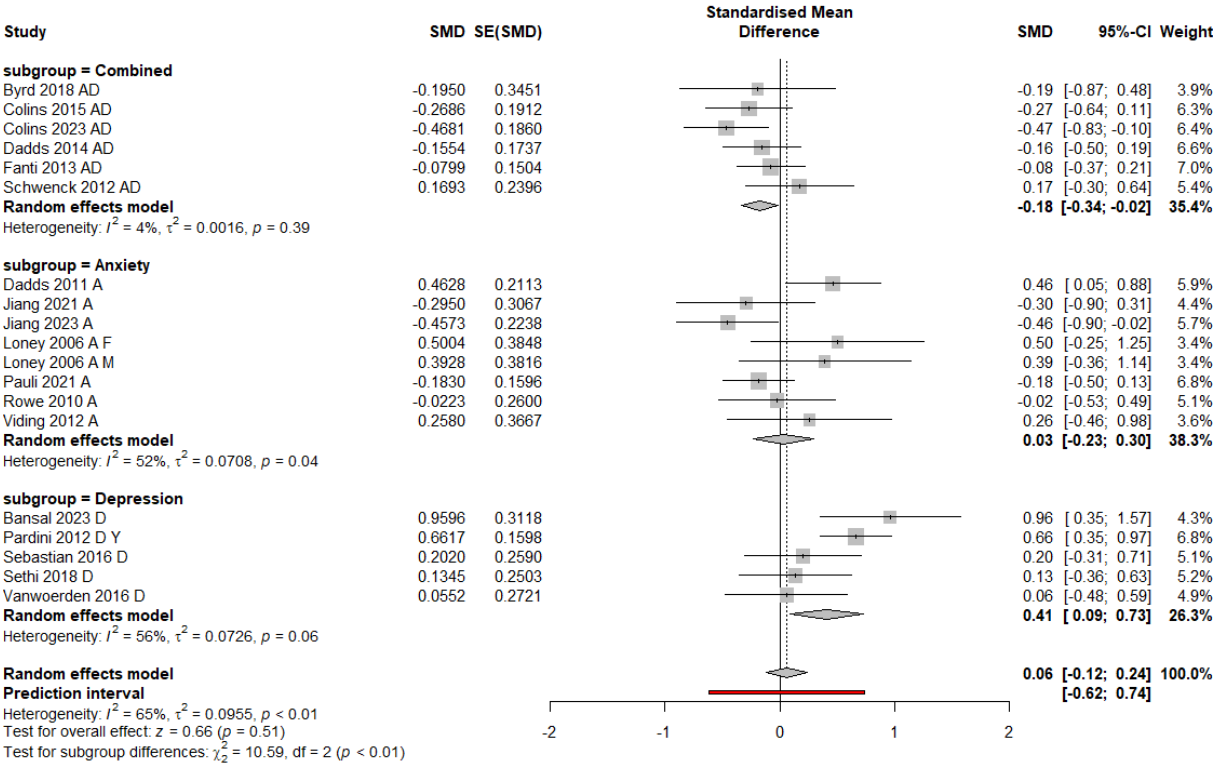
Section and Topic	Item #	Checklist item	Location where item is reported
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	35
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	34
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	41-42
	23b	Discuss any limitations of the evidence included in the review.	46
	23c	Discuss any limitations of the review processes used.	47
	23d	Discuss implications of the results for practice, policy, and future research.	44-45
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	10

Appendix 2: Meta-Analysis - Sensitivity Analyses



Note. Sensitivity analysis including one outcome (i.e., anxiety, depression or combined) reported in each study and excluding other outcomes (e.g., Bansal et al., 2023 A and D). Loney et al., (2006) reported outcomes for males and females separately and therefore included in this analysis.


Study
SMD
SE(SMD)
Standardised Mean Difference
SMD
95%-CI
Weight
subgroup = Combined
Byrd 2018 AD -0.1950 0.3451 -0.19 [-0.87; 0.48] 4.5%
Colins 2015 AD -0.2686 0.1912 -0.27 [-0.64; 0.11] 5.8%
Colins 2023 AD -0.4681 0.1860 -0.47 [-0.83; -0.10] 5.9%
Dadds 2014 AD -0.1554 0.1737 -0.16 [-0.50; 0.19] 5.9%
Fanti 2013 AD Y 1.4645 0.1693 1.46 [1.13; 1.80] 6.0%
Schwenck 2012 AD 0.1693 0.2396 0.17 [-0.30; 0.64] 5.4%
Random effects model 0.10 [-0.56; 0.75] 33.6%
Heterogeneity: I^2 = 94%, τ^2 = 0.6175, p < 0.01
subgroup = Anxiety
Bansal 2023 A 0.2960 0.3002 0.30 [-0.29; 0.88] 4.9%
Dadds 2011 A 0.4628 0.2113 0.46 [0.05; 0.88] 5.7%
Jiang 2021 A -0.2950 0.3067 -0.30 [-0.90; 0.31] 4.9%
Jiang 2023 A -0.4573 0.2238 -0.46 [-0.90; -0.02] 5.6%
Loney 2006 A F 0.5004 0.3848 0.50 [-0.25; 1.25] 4.2%
Loney 2006 A M 0.3928 0.3816 0.39 [-0.36; 1.14] 4.2%
Random effects model 0.12 [-0.25; 0.49] 29.4%
Heterogeneity: I^2 = 61%, τ^2 = 0.1277, p = 0.02
subgroup = Depression
Pardini 2012 D Y 0.6617 0.1598 0.66 [0.35; 0.97] 6.0%
Pauli 2021 D 0.1322 0.1447 0.13 [-0.15; 0.42] 6.2%
Rowe 2010 D -0.4195 0.3244 -0.42 [-1.06; 0.22] 4.7%
Sebastian 2016 D 0.2020 0.2590 0.20 [-0.31; 0.71] 5.3%
Sethi 2018 D 0.1345 0.2503 0.13 [-0.36; 0.63] 5.3%
Vanwoerden 2016 D 0.0552 0.2721 0.06 [-0.48; 0.59] 5.2%
Viding 2012 D 0.0993 0.3654 0.10 [-0.62; 0.82] 4.4%
Random effects model 0.18 [-0.07; 0.43] 37.0%
Heterogeneity: I^2 = 52%, τ^2 = 0.0551, p = 0.05
Random effects model 0.13 [-0.13; 0.38] 100.0%
Prediction interval [-0.97; 1.22]
Heterogeneity: I^2 = 83%, τ^2 = 0.2534, p < 0.01
Test for overall effect: z = 0.98 (p = 0.33)
Test for subgroup differences: χ^2_2 = 0.10, df = 2 (p = 0.95)
-2
-1
0
1
2


Study
SMD
SE(SMD)
Standardised Mean Difference
SMD
95%-CI
Weight
subgroup = Combined
Byrd 2018 AD -0.1950 0.3451 -0.19 [-0.87; 0.48] 3.9%
Colins 2015 AD -0.2686 0.1912 -0.27 [-0.64; 0.11] 6.3%
Colins 2023 AD -0.4681 0.1860 -0.47 [-0.83; -0.10] 6.4%
Dadds 2014 AD -0.1554 0.1737 -0.16 [-0.50; 0.19] 6.6%
Fanti 2013 AD -0.0799 0.1504 -0.08 [-0.37; 0.21] 7.0%
Schwenck 2012 AD 0.1693 0.2396 0.17 [-0.30; 0.64] 5.4%
Random effects model -0.18 [-0.34; -0.02] 35.4%
Heterogeneity: I^2 = 4%, τ^2 = 0.0016, p = 0.39
subgroup = Anxiety
Dadds 2011 A 0.4628 0.2113 0.46 [0.05; 0.88] 5.9%
Jiang 2021 A -0.2950 0.3067 -0.30 [-0.90; 0.31] 4.4%
Jiang 2023 A -0.4573 0.2238 -0.46 [-0.90; -0.02] 5.7%
Loney 2006 A F 0.5004 0.3848 0.50 [-0.25; 1.25] 3.4%
Loney 2006 A M 0.3928 0.3816 0.39 [-0.36; 1.14] 3.4%
Pauli 2021 A -0.1830 0.1596 -0.18 [-0.50; 0.13] 6.8%
Rowe 2010 A -0.0223 0.2600 -0.02 [-0.53; 0.49] 5.1%
Viding 2012 A 0.2580 0.3667 0.26 [-0.46; 0.98] 3.6%
Random effects model 0.03 [-0.23; 0.30] 38.3%
Heterogeneity: I^2 = 52%, τ^2 = 0.0708, p = 0.04
subgroup = Depression
Bansal 2023 D 0.9596 0.3118 0.96 [0.35; 1.57] 4.3%
Pardini 2012 D Y 0.6617 0.1598 0.66 [0.35; 0.97] 6.8%
Sebastian 2016 D 0.2020 0.2590 0.20 [-0.31; 0.71] 5.1%
Sethi 2018 D 0.1345 0.2503 0.13 [-0.36; 0.63] 5.2%
Vanwoerden 2016 D 0.0552 0.2721 0.06 [-0.48; 0.59] 4.9%
Random effects model 0.41 [0.09; 0.73] 26.3%
Heterogeneity: I^2 = 56%, τ^2 = 0.0726, p = 0.06
Random effects model 0.06 [-0.12; 0.24] 100.0%
Prediction interval [-0.62; 0.74]
Heterogeneity: I^2 = 65%, τ^2 = 0.0955, p < 0.01
Test for overall effect: z = 0.66 (p = 0.51)
Test for subgroup differences: χ^2_2 = 10.59, df = 2 (p < 0.01)
-2
-1
0
1
2

Appendix 3: Ethical Approval for Empirical Study

UNIVERSITY OF BIRMINGHAM

Dear Andrew Surtees

RE: Children's mood and Theory of Mind

Application for Ethical Review: ERN_0372-Apr2023

Thank you for your application for ethical review for the above project, which was reviewed by the Science, Technology, Engineering and Mathematics Committee.

On behalf of the Committee, I confirm that this study now has ethical approval.

Any adverse events occurring during the study should be promptly brought to the Committee's attention by the Principal Investigator and may necessitate further ethical review.

Please ensure that the relevant requirements within the University's Code of Practice for Research and the information and guidance provided on the University's ethics webpages (available at https://intranet.birmingham.ac.uk/finance/accounting/Research-Support-Group/Research-Ethics/Links-and-Resources.aspx) are adhered to.

Please be aware that whilst Health and Safety (H&S) issues may be considered during the ethical review process, you are still required to follow the University's guidance on H&S and to ensure that H&S risk assessments have been carried out as appropriate. For further information about this, please contact your School H&S representative or the University's H&S Unit at [redacted].

Kind regards,

The Co-Chairs of the Science, Technology, Engineering and Mathematics Committee

E-mail: [redacted]

Appendix 4: Information Sheet for Participants' Parents

Dear Parent/guardian

We are writing to inform you about an exciting research study that will be taking place at your child's school. Your child's school has kindly accepted for your child to take part in this research. In this letter, you will be given information about the study and a choice to withdraw your child's participation.

What does the research involve?

The research project aims to explore how emotions might impact children's ability to perspective take. Perspective taking is a key component of successful social communication and interaction, which highlights the importance of this research study. Therefore, this research aims to contribute to the developing knowledgebase of how emotions may shape the processes involved in perspective taking and at what point in the lifespan.

Children will be invited to watch an age-appropriate short film clip, before being asked to complete a task with the experimenter. It is anticipated that testing will take between 10-15 minutes and should not significantly disrupt your child's learning. The task is designed to be fun and engaging and children will be offered a sticker for taking part. Children also have the choice to stop the task at any point.

Who can take part?

Children between the ages of three and ten years old are invited to take part. As children tend to enjoy taking part in new activities we invite all children to participate, however if your child has an intellectual disability and/or any neurodevelopmental disorders their data will not be included in the analysis.

Is the data anonymous?

All records will be kept confidential. We will record your child's class and identify initials so that if you decide to withdraw your child from the study we would be able to do so. At the end of the study, all personal details will be destroyed. Ten years after the end of the study, we will destroy all anonymous data collected during the study. Once the study is completed, an anonymised version of the data will be made publicly available.

Personal identifying information will be treated as strictly confidential and handled in accordance with the provisions of the General Data Protection Regulation 2018 (GDPR) and the Data Protection Act 2018. More information on how the University processes personal data can be found on the University's website on the page called 'Data Protection - How the University Uses Your Data' (https://www.birmingham.ac.uk/privacy/index.aspx).

Can I withdraw from the study?

Children's participation is voluntary, and they are free to stop taking part in the study at any point. Children can be withdrawn from the study up to 14 days following participation, without giving a reason and we will destroy all their data. After this point any records we hold of children's personal details will be destroyed. This means that we would no longer be able to trace a child's results back to them and withdraw them from the study.

What are some of the potential risks of taking part?

Participating in this research will not expose children to any greater risks than in their everyday environment.

Further information

Please do not hesitate to contact a member of the research team if you have any questions or require any more information. If you would prefer a verbal explanation of the research, please contact Bryony or Pardis who will be happy to help with this. Individual children's results on the task may not be meaningful to share and therefore we will not be able to provide individual feedback.

If you would like to receive a summary of the study results, please let us know via email.

Yours sincerely,

Bryony Fenton and Pardis Hashmezadeh

Contact details:

Bryony Fenton, Trainee Clinical Psychologist [redacted]

Pardis Hashmezadeh, Trainee Clinical Psychologist [redacted]

Dr Andrew Surtees, PhD, ClinPsyD [redacted]

This study has been approved by the University of Birmingham Ethical Review Committee. If you have any concerns about the study, then please contact the Head of Research Governance.

Thank you for taking the time to read this information sheet.

Appendix 5: Consent Form

The Effect of Mood on Children's Perspective Taking

I confirm that I have read and understood the attached information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

I understand that participation of all children is voluntary and that I am free to withdraw consent without giving any reason. ☐

I understand that I can contact the researchers up to 14 days after participation in the study to withdraw any child's data. If I do this the child's data will be destroyed. ☐

I understand that all information collected during the study will be confidential. Only members of the research team will know who has participated in the study. All information collected during the study will be stored in locked or password protected storage that only members of the research team will have access to. No names will be published in any reports. Anonymous datasets (with all personal information removed) will be made publicly available. Information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 2018. ☐

I understand that my contact details will only be used by the research team for the purpose of this study alone. ☐

I agree to distribute parental information sheets to the parents/carers of all children who are eligible to participate in the study. ☐

I consent for the eligible children in my school to take part in the study 'The Impact of mood on children's perspective taking'. ☐

Print Name: Signature: _____

Date: Name of school/nursery:

Address: Email:

Telephone number: Relationship to participants:

Appendix 6: Information Sheet for Headteachers

Dear Headteacher,

Our names are Bryony Fenton and Pardis Hashmezadeh and we are postgraduate psychology students from The University of Birmingham's School of Psychology. Please read this information sheet carefully before deciding whether you wish for the children in your school/nursery to take part in this study.

What does the research involve?

The research project aims to explore how emotions might impact children's ability to perspective take. Perspective taking is a key component of successful social communication/interaction. However, children's experiences are currently relatively unexplored. Therefore, this research aims to contribute to the developing knowledgebase of how emotions may shape the processes involved in perspective taking and at what point in the lifespan.

Prior to testing, class teachers will be asked to provide the initials, class name/number and year and month of birth for each child participating. They will also be asked to indicate if the child has an intellectual disability and/or any neurodevelopmental disorders (to their knowledge).

The research will involve children firstly watching a brief age-appropriate film clip, with the aim to induce either a happy or neutral mood. Children will then complete a simple age-appropriate task with the experimenter. During the task they will be asked to try and take another's perspective. It is anticipated that testing will take between 10-15 minutes of the child's time, to minimise the impact on their classroom activities. The task is designed to be fun and engaging and children will be offered a sticker for taking part. Children also have the choice to stop the task at any point.

Who can take part?

Children between the ages of three and ten years old are invited to take part. Although children who have an intellectual disability and/or any neurodevelopmental disorders will be invited to participate, their data will not be included in the analysis.

Is the data anonymous?

All records will be kept confidential. Any personal details (e.g., child initials) will be kept separately from any other data in an encrypted electronic folder. Participants will be identified through the study by an ID number. Any hard copies will be stored in a locked file cabinet at The University of Birmingham. Electronic copies of data will be kept on secure University computer systems. Only the researchers and supervisor will have access to the data. At the end of the study, any personal details will be destroyed. Ten years after the end of the study, we will destroy all anonymous data collected during the study.

Once the study is completed, an anonymised version of the data, in which no child could be individually identified, will be made publicly available in line with good practice in open research.

Personal identifying information will be treated as strictly confidential and handled in accordance with the provisions of the General Data Protection Regulation 2018 (GDPR) and the Data Protection Act 2018. More information on how the University processes personal data can be found on the University's website on the page called 'Data Protection - How the University Uses Your Data' (https://www.birmingham.ac.uk/privacy/index.aspx).

Can I withdraw from the study?

Children's participation is voluntary, and they are free to stop taking part in the study at any point. Children can be withdrawn from the study up to 14 days following participation, without giving a reason and we will destroy all their data. After this point any records we hold of children's personal details will be destroyed. This means that we would no longer be able to trace a child's results back to them and withdraw them from the study.

What are some of the potential risks of taking part?

Participating in this research will not expose children to any greater risks than in their everyday environment.

What do we have to do as a school/nursery?

If you are happy for the children in your school/nursery to take part in the study, please read and complete the attached consent form.

We will then contact you to arrange a set of dates where we are able to visit and carry out testing. Prior to testing we would ask you to please send out provided parental information sheets to the parents/carers of all children who are the eligible age to participate.

Further information

Please do not hesitate to contact a member of the research team if you have any questions or require any more information. If you would prefer a verbal explanation of the research, please contact Bryony or Pardis who will be happy to help with this. If you would like to receive a summary of the study results, please let us know via email.

Yours sincerely,
Bryony Fenton and Pardis Hashmezadeh

Contact details:

Bryony Fenton, Trainee Clinical Psychologist [redacted]
Pardis Hashmezadeh, Trainee Clinical Psychologist [redacted]
Dr Andrew Surtees, PhD, ClinPsyD [redacted]

This study has been approved by the University of Birmingham Ethical Review Committee. If you have any concerns about the study, then please contact the Head of Research Governance.

Thank you for taking the time to read this information sheet.