A Systematic Review and Meta-Analysis of the overlap in Narcissistic Personality Disorder and Autistic Spectrum Disorder and the effectiveness of interventions targeting empathy.

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Abstract

Background: Narcissistic personality disorder (NPD) and autistic spectrum disorder (ASD) both have empathy deficits as part of the diagnosis. It is unclear what the prevalence is between these conditions and how gender might vary. Empathy interventions for children and adolescents with ASD have been effective in increasing social and empathy-related deficits. However, outcome research for adults with ASD appears more limited.

Methods: A systematic review and narrative synthesis were carried out on the overlap of NPD and ASD to understand empathy. A systematic review and meta-analysis on the effectiveness of non-pharmacological interventions to increase empathy in adults with ASD was also conducted.

Results: In the systematic review examining the overlap between NPD and ASD, the literature found that these populations recruited into studies often have a low bar for diagnostic inclusion. This includes often poorly validated self-report measures. Heterogeneity in the studies meant there was unsuitable data to carry out meta-analysis to determine the overlap. In the meta-analysis exploring interventions aimed at adults with ASD, a moderate effect size was found.

Conclusions: Together these papers suggest that people with NPD and ASD do experience difficulties with empathy, yet the type of empathy difficulty varies depending on the condition. Limitations of the current literature make it difficult to determine the prevalence of both ASD and NPD. Future research to address this includes consistent use of classification systems and gold-standard diagnostic tools as well as clearer and consistent operationalised definitions of empathy. Non-pharmacological interventions have a moderate effect in increasing empathy for adults with ASD, however, further research in this area is warranted.

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Glossary

This thesis portfolio references a range of terms and terminology commonly used in academia and clinical practice. The following glossary provides working definitions of how each of these terms are operationalised.

Ambivalence A state of having simultaneous conflicting reactions, beliefs, or feelings.

Autism A neurodevelopmental condition which is characterized by difficulties with social interaction, communication and restricted or repetitive patterns of thought and behaviour. It can also include sensory sensitivities such as being overly or underly sensitive to any sense, for example taste, sound, smell, touch, pain or light.

Autistic Spectrum Disorder A neurodevelopmental condition involving persistent challenges with social communication, restricted interests, and repetitive behaviour. It is a spectrum condition as individuals vary in the degree of difficulty, they have with the challenges mentioned.

Cognitive Empathy To have more complete and accurate knowledge about the contents of another person's mind, including how the person feels. It is also known as empathic accuracy.

Developmental Disorder Impairments in a child's physical, cognitive, language, or behavioural development. They can impact everyday functioning and usually last throughout a person's lifetime. Developmental disorders can affect physical abilities, such as vision, and mental abilities, such as learning.

Empathy The ability to understand and share the feelings of another.

Emotional (aka Affective) Empathy This is when you can feel another person's emotions. If you're sitting close to a loved one and they start to cry, for example, you might begin to feel sad too.

Learning Disability A reduced intellectual ability and difficulty with everyday activities for example household tasks, socialising or managing money which affects someone for their whole life.

Mentalising The ability to interpret or understand behaviour (one's own as well as that of others) as psychologically motivated in terms of underlying intentions and mental states, such as thoughts, feelings, wishes, and intentions.

Narcissism A personality type characterized by a grandiose sense of self-importance, a lack of empathy for others, a need for excessive admiration, and the belief that one is unique and deserving of special treatment.

Narcissistic Personality Disorder A personality disorder characterized by an exaggerated sense of self-importance, a need for admiration, and a lack of empathy for other people.

Neurological is related to disorders of the nervous system which affects the brain as well as the nerves found throughout the human body and the spinal cord. Structural, biochemical or electrical abnormalities in the brain can result in a range of symptoms.

Neurodiversity The wide variety of ways we think, learn, feel and process information. We all have different interests and motivations and are naturally better at some things and not so good at others.

Neurodevelopmental Disorder A condition that affects how your brain functions. They range from mild impairments, allowing those affected to live functional lives, to severe disorders that require lifelong care.

Theory of Mind The understanding that other individuals have mental states, such as knowledge, intentions, and beliefs.

Chapter 1. Introduction to Thesis Portfolio

The portfolio presented is broken down into several chapters. This includes a systematic review and narrative synthesis of the overlap in narcissistic personality disorder (NPD) and autistic spectrum disorder (ASD) to understand empathy challenges. This was formatted for publication in the Journal of Psychiatric and Mental Health Nursing for Author Guidelines (See Appendix A). It also includes a systematic review and meta-analysis on the effectiveness of non-pharmacological interventions to increase empathy in adults with ASD. This was formatted for publication in the Journal of Psychiatric Research for author guidelines (See Appendix B).

Before embarking on this research project two focus groups were completed as part of Patient and Public Involvement (PPI) to understand professionals' interest and thirst for knowledge in this area (See Appendix C). These took place within two NHS services; a personality disorder team and an autism team which included professionals from the wider multidisciplinary team, including, peer support workers with lived experience. The purpose of this thesis portfolio was to add to the existing literature by identifying, evaluating, and summarizing the findings of studies on NPD and ASD. As well as systematically synthesizing the findings to provide an effect size related to empathy interventions for adults with ASD.

Before getting to the systematic review this thesis portfolio will initially outline the literature on the prevalence and overlap of personality disorder and ASD. It will discuss the developments of each diagnostic criterion and describe changes and adaptations to the diagnoses to highlight issues such as diagnostic inflation. It will also detail some of the literature on gender differences and similarities in ASD and personality disorders more broadly as well as describe research on the clinical characteristic of empathy. A meta-analysis and systematic review were planned to be carried out to review the prevalence and overlap of NPD and ASD.

The systematic review will outline a search strategy implemented following a scoping review and then pre-registered on a database. The review included adults with a diagnosis of NPD or ASD using predetermined gold-standard psychometric tools. After searches were completed, the findings were that the data was not suitable to conduct a meta-analysis due to clinical heterogeneity in the studies. Another quantitative and qualitative data analysis approach was considered instead, namely fuzzy-set qualitative comparative analysis (Ragin, 2000). However, it came to light that due to complex reasons the data was also unsuitable for this analytical approach meaning we would be unable to be confident in the findings from the analysis. Therefore, this data was analysed using a narrative synthesis as it was deemed that this method would be suitable for the data collected and would be able to systematically describe the data collected. This method of data analysis will be presented to synthesise the study characteristics in table form, the individual study findings, and relationships between studies as well as presenting information on the quality of the studies. A bridging chapter is then provided to transition from the systematic review paper to the empirical paper.

Secondly, the empirical paper outlines the literature on ASD in adults and, empathy interventions. It will outline research that has attempted to determine the relationship between empathy and ASD. The varying definitions of empathy are noted along with definitions proposing subtypes of empathy. Previous literature exploring the effectiveness of empathy interventions will be described. It will demonstrate some of the empathy interventions that have been researched for use in children and adolescents but will also highlight the lack of research for empathy interventions in adults with ASD populations.

Additional chapters are provided to support the systematic review and meta-analysis. The first extended chapter will delve into the construct of empathy and will examine this concept in more detail. The second extended chapter will highlight potential covariates and

comorbidities that are imperative to discuss. This will focus on more granular detail on the role of gender in personality disorders and ASD, as well as how the presence of learning disabilities may play a role in clinical presentations. Then the discussion and critical evaluation chapter will focus on the overall experience of undertaking this research including the strengths and limitations. It will share considerations of the implications of this thesis portfolio both for the research community and the clinical needs of the people we work with.

An overview of the historical development of diagnostic criteria for NPD and ASD is presented to gain a richer understanding of each disorder. Then, the current symptomatology of each disorder is described using the two most widely recognised diagnostic classifications used in research and clinical practice. This will introduce the overlap in clinical symptomatology between these presentations: namely, empathy. To provide context the portfolio starts with an overview of the historical development of each diagnostic criterion. This is presented to gain a richer understanding of each disorder.

History of narcissistic personality disorder

Given a large focus of the portfolio relates to NPD it would be appropriate to provide a brief overview of this disorder and how it has evolved for the reader. This has important implications for the lens that the current literature often views or approaches this disorder with. Firstly, Narcissism is recognised as a personality trait. Historically, the term was used when describing clinical populations and was often associated with psychodynamic literature. However, in more recent years it is a word that has become more commonly used in everyday language. The concept of pathological narcissism was first described by Freud (1914) in his essay "On Narcissism" where he argued that the libido (which forms part of the Id) overlaps with narcissism which could therefore be a phase of sexual development. He also argued that narcissism relates to self-preservation. Later, Otto Kernberg, a fellow Psychoanalyst who

worked extensively on narcissistic pathology, critiqued Freud's work. The criticism was cited in a book edit in which Kernberg (as summarised by Fonagy, 2018) suggested that Freud's original work did not operationalise pathological narcissism as a spectrum trait. A spectrum approach suggests that narcissism can be understood as being on a continuum with some people leaning towards the extreme end of the spectrum which would be pathological. Kernberg and Kohut disagreed on 'normal' vs. 'pathological' narcissism. According to Kohut's self-psychology model he proposed that narcissistic psychopathology was a result of parental lack of empathy during development. Furthermore, by failing to provide appropriate empathic feedback during critical times in a child's development, Kohut argued that the child does not develop the ability to regulate self-esteem, and so the adult vacillates between an irrational overestimation of the self and feelings of inferiority (McLean, 2007). It is the group of people who exist on the pathological end of the spectrum (along with other clinically defined characteristics) that would make up this cohort of people meeting the criteria for NPD.

The Diagnostic and Statistical Manual of Mental Disorders (DSM-III) in 1980 (American Psychiatric Association) was the first time that NPD was recognised. In the DSM-III-R (American Psychiatric Association, 1987) the criterion was reorganised, and an additional criterion related to the preoccupation with feelings of envy was added. Following that, in the DSM-IV (American Psychiatric Association, 1994) the lack of empathy criterion was revised to increase discrimination of NPD from the lack of remorse exhibited in antisocial personality disorder (Morey, 1988). Afterwards, in the DSM, fourth edition, Text Revision (DSM-IV-TR) [2000] NPD was defined as an all-pervasive pattern of grandiosity (in fantasy or behaviour), need for admiration or adulation and lack of empathy, usually beginning in early adulthood and remaining present in various contexts. To note, the diagnostic criteria remained the same for DSM-IV and DSM-V (APA, 2013).

History of autistic spectrum disorder

Historically, the term autism was coined in 1911 by Eugen Bleuler who was a Psychiatrist, however, this term was used to describe severe cases of schizophrenia, which was also a term that Bleuler had formed (Bleur, 1911, 1950). According to Bleuler, autistic thinking was characterized by infantile wishes to avoid unsatisfying realities and replace them with fantasies and hallucinations (Evans, 2013). Bleur's understanding of autism was developed from his research into schizophrenia and this initial understanding of autism was a detachment from reality, fantasy in the form of hallucinations, and ambivalence. Hence, Bleur described autism as a symptom of childhood schizophrenia which led to child psychiatrists using childhood schizophrenia, autism, and child psychosis interchangeably (Rutter, 1978).

It is lesser known that Grunya Sukhareva in 1925, first described a list of symptoms that might describe aspects of autism. In her discussion of 'schizoid psychopathy', Sukhareva referred to Eugen Bleuler's conceptions of the phenomenon (Sher & Gibson, 2023). However, the term autism was then used by Leo Kanner (1943) who outlined what was known as classical autism. Asperger (1944) then described autism in children. Following this, Winnicott posited a psychoanalytic theory of autism and in the early 1950s.Winnicott began to develop the specific language of 'autistic states' in infants which he argued was essentially a psychological state of defensive pathological introversion in which the infant lives permanently in his or her inner world, which is not, however, firmly organised (Evans, 2017). Therefore, a child may be stuck in their inner world without developing into an external reality and Winnicott used the term autism in his description of these states. It was not until 1979 that Wing and Gould coined the term autistic spectrum disorder (ASD). ASD has been defined in a previous version of the International Classification of Diseases (ICD-10) World Health Organisation, (2016) and the DSM as Asperger's syndrome, classic autism, and high-functioning autism. A new edition of the International Classification of Diseases, the ICD-11

World Health Organization, (2022) no longer uses the term Aspergers. Additionally, the DSM-V (APA,2013) has also removed the term Asperger's meaning this term will not be used for diagnosis in future. Therefore, the contemporary convention is to use the term autistic spectrum disorder. In terms of a preferential term between ASD and autistic spectrum condition, for purposes of this review, the term autistic spectrum disorder will be used as this is the current term used in diagnostic guidance. Although there is a lot of overlap with learning disabilities and ASD this portfolio does not discriminate between people with lower or higher IQ and functioning. It relies on the specificity of the ASD diagnosis for inclusivity.

Whilst significant literature exists on the theoretical and clinical components of both ASD and NPD there appears to be limited literature on the overlap in clinical symptomatology between these presentations. The symptomatology for both NPD and ASD classifies an empathy deficit. The diagnostic overlap with the clinical characteristic of empathy will be described in more detail. Research findings have suggested that disorders such as autism may be associated with neurological impairments in neural pathways related to empathy (Shamay-Tsoory, 2011) so empathy is known to be a complex, multi-dimensional process. Research has suggested that empathy can be impaired at multiple stages, producing disorders of empathy with separable underlying causes (Preston et al., 2020). Additionally, there was a clear gap in the literature for a review of non-pharmacological interventions to increase empathy in adults. This thesis portfolio attempts to address this gap in the literature through an empirical paper and a systematic review. Therefore, a meta-analysis was carried out to understand this. The purpose of the systematic review and meta-analysis of non-pharmacological empathy interventions in adults with ASD empathy interventions was to combine studies that met the inclusion criteria to aggregate an effect size of empathy interventions to understand the effectiveness of non-pharmacological interventions in adults with ASD

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Chapter 2. Systematic Review

A Systematic Review of the Prevalence and Overlap in Narcissistic Personality Disorder and Autistic Spectrum Disorder: Understanding Empathy Challenges.

NPD and ASD overlap: empathy challenges

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Abstract

Background: Although diagnostically different narcissistic personality disorder (NPD) and autistic spectrum disorder (ASD), share criteria related to empathy challenges. Prevalence appears to vary in both, and ASD diagnosis has increased possibly due to increased awareness and changes in the Diagnostic and Statistical Manual of Mental Health and the International Classification of Diseases with an unclear relationship between each.
Aim/Question(s): To determine the overlap between NPD and ASD worldwide. It asked what the differences and similarities in empathy and gender are in both NPD and ASD. Methods: A systematic review was conducted. Searches yielded 411 results. After applying inclusion criteria, seven remaining studies were assessed for quality and bias ratings were provided. Data were analysed using narrative synthesis. Results: Meta-analysis was not possible due to heterogeneity. Most studies focused on NPD, and two focused on both NPD and ASD. Psychometric instruments used for diagnosis varied. Males were more prevalent. Discussion: Prevalence remains difficult to estimate due to variability in the psychometric tools used. Empathy overlaps in both diagnoses, yet there are different types.
Implications: Tentative implications related to gender were suggested. In-depth developmental histories and shared decision-making were suggested for clinicians working with co-occurring symptomatology to improve the care provided.

Key Words: Aspergers; Autistic Spectrum Disorder; Autism; Empathy; Narcissistic; Personality Disorder; Narcissism; Theory of Mind

Introduction

Narcissistic personality disorder (NPD) first appeared in the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) in 1980 (American Psychiatric Association). It was defined as one subtype of an overall construct or diagnosis of a personality disorder (Yakeley, 2018). Inclusion for a diagnosis included a grandiose sense of self-importance, preoccupation with success, a reaction to criticism characterized by rage, shame or humiliation, or cool indifference, and at least two characteristic interpersonal disturbances, such as entitlement, alternating with devaluation, or lack of empathy (Cain & Boussi, 2020). Subsequent revisions of the DSM have led to changes in the diagnostic criteria for NPD with the current version of the DSM (DSM-5) defining NPD as a pattern of grandiosity, need for admiration, and lack of empathy. To receive a diagnosis of NPD the person would meet the criteria for impairments in self-functioning and self-direction and they would experience impairments in interpersonal functioning including empathy or being antagonistic characterized by grandiosity. These would be stable over time and context and not better explained by another difficulty (APA, 2013). A dimensional assessment arguing that narcissism occurs on a spectrum of severity from normal to pathological was suggested (Yakeley, 2018).

Currently, NPD is listed in the APA's Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR) (APA, 2013). Researchers and clinicians suggested changes to the diagnosis of personality disorders yet, the APA ultimately retained the current categorical approach with the same ten personality disorders. However, a dimensional-categorical model was included in Section III of DSM-5 to prompt continued research; the Section III Alternative Model of Personality Disorders (AMPD). This model advises a dimensional rating on the severity of impairments in personality functioning (how an individual typically experiences himself or herself as well as others) and characterizes five broad areas of pathological personality traits. It identifies six personality disorder types, each

defined by a specific pattern of impairments and traits, and NPD is one of them. The AMPD model assessed NPD based on meeting criteria in domains of personality dysfunction (i.e., self-direction, identity, empathy, intimacy) and personality traits (attention seeking and grandiosity) (APA, 2013). Despite numerous revisions, an absence of empathy remains a core feature.

Autism was first described by Grunya Sukhareva in 1925 (Sukhareva, 1925) in a list of symptoms that might describe aspects of an autistic presentation. The term autism was first coined by Leo Kanner (1943) who outlined characteristics such as rigidity, repetition, and difficulties in establishing and maintaining social interactions, that might be described today as classical autism. Parallel to this Hans Asperger (1944) described a similar triad of impairment in another group of children who were functioning at a higher level. The work of Kanner and Asperger (1944) existed independently until Wing and Gould (1979) unified these descriptions, coining the term autistic spectrum disorder (ASD) which summarised three core symptoms of difficulties with social interaction, communication, and imagination (which are referred to as the 'triad' of impairments), and included a repetitive stereotyped pattern of activities. Diagnostic criteria for both conditions propose a spectrum, with the more severe/impaired hitting the threshold for a diagnosis. ASD is defined as a neurodevelopmental disorder defined by the following criteria in DSM-5 (APA, 2013). Domain A: involves persistent deficits in social-emotional reciprocity and deficits in nonverbal communicative behaviours. Domain B: includes stereotyped or repetitive motor movements, an insistence on sameness and an inflexible adherence to routines. As well as highly restricted, fixated interests that are abnormal in intensity. Additionally, ASD is a spectrum-based disorder with severity based on social communication impairments and restricted and repetitive patterns of behaviour (APA, 2013). Whilst DSM-5 criteria require that symptoms must present in early developmental years, some literature indicates that

symptoms do not fully manifest until social demands exceed limited capacities and may be masked by learned strategies (Hull et al., 2017).

Accurately understanding prevalence is complicated by significant disparities in the research. Identifying the global prevalence of each 'disorder' varies in the literature. In terms of the prevalence of ASD, the difference between prevalence continues to vary; Roman-Urrestarazu et al. (2021) found that the prevalence of ASD was 1.76%, while Zeidan et al. (2022) suggested a global autism median prevalence of 1%. Yet, a meta-analysis by Salari et al. (2022) proposed a global prevalence of ASD closer to 0.6%. Variability in prevalence across the world is likely due to methodological differences in case detection, making it difficult to identify an exact figure. Furthermore, funding for ASD diagnostic pathways varies greatly, which confounds the quality of assessments undertaken. In terms of gender prevalence, Adak and Halder (2017) reviewed 26 studies with most studies finding male dominance in ASD. No study found female dominance. However, more recent research indicates females with ASD have been underdiagnosed, but detection is now improving (Calderoni, 2023). Suckle (2012) notes that some females attempt to cope and compensate through masking and attempting to camouflage with society. This can impact being able to gather behavioural evidence for a diagnosis.

A recent meta-analysis explored changes in psychiatric diagnosis since the publication of DSM-III to DSM-5 and argues that there is a broadening of disorders and has termed this 'diagnostic inflation' (Fabiano & Haslam, 2020). This is not a new concern as Wing and Potter (2002) previously raised concerns about this phenomenon existing in ASD. A consequence of diagnostic inflation is that diagnoses become less stringently defined and prevalence increases, thus making it harder to accurately determine prevalence. Consistent with this it has been suggested that the overall relatively low prevalence rates of NPD reported in samples from both clinical settings and the general population may in part be due

to the narrow concept identified by the DSM-5 diagnosis. Research suggests that this does not capture the more vulnerable aspects of pathological narcissism (Yakeley, 2018).

Numerous studies have attempted to identify the prevalence of personality disorders globally. Whilst these studies have varied in quality, they have produced a range of estimates from 12.16% Volkert et al. (2018) down to 6.2% in a large national survey on the prevalence of NPD by Hasin and Grant (2015). Many studies suggest somewhere in between such as 7.8% (Winsper et al.,2020). The gender prevalence of personality disorders also contains variance in the literature. Previously research suggested females are more likely to receive a diagnosis of borderline/emotionally unstable personality disorder (BPD/EUPD) (Busch et al., 2016). More recent research suggests that the gender prevalence in EUPD is not as biased towards females as previously thought (Sansone & Sansone, 2011). Males however are more likely to receive a diagnosis of NPD (Silberschmid et al., 2015). Lastly, when considering gender in ASD females have been purported to have difficulties expressing certain types of empathy (Stroth et al., 2019).

An additional comorbidity to consider concerning prevalence is a diagnosis of a learning disability. Research suggests that a high proportion of people with ASD also have a diagnosis of a learning disability (O'Brien & Pearson, 2004; Matson & Shoemaker, 2009). Additionally, Flynn et al. (2002) suggested comorbidity between personality disorders and adults with a learning disability. The researchers noted the personality disorder diagnosis showed a significant association with early traumatic experience (Ball, 2009: Bierer et al., 2003).

Because of the factors discussed, synthesising the research concerning the prevalence of both NPD and ASD is difficult to ascertain with any great certainty. This is due to themes of cultural idiosyncrasies that might make it harder to reliably determine how gold standard

assessment processes are used, and inconsistency in determining thresholds and when this is met.

Whilst there are difficulties determining the prevalence of both NPD and ASD as individual constructs and standalone diagnoses, the literature is even less clear when it comes to trying to disentangle and understand what overlap, if any, exists between both presentations. Any attempt to untangle both presentations is complicated by the fact that the diagnostic criteria for both disorders refer to empathy deficits.

Research findings have suggested that neurodevelopmental conditions such as autism may be associated with neurological impairments in neural pathways related to empathy (Shamay-Tsoory, 2011). It has also been noted that difficulties in empathy are linked to psychopathy (Ali, Amorim, & Chamorro-Premuzic, 2009; Blair, 2008). As Wright and Edershile (2018) discussed, the (DSM–5), Section III AMPD NPD diagnostic criteria reflect each of these dimensions. For example, Criterion A contains content related to vulnerability (e.g., “exaggerated self-appraisal may be inflated or deflated or vacillate between extremes”), Criterion B encompasses grandiosity (e.g., “firmly holding to the belief that one is better than others”), and features of entitlement are found in both Criterion A (e.g., “personal standards are [...] too low based on a sense of entitlement”) and Criterion B (e.g., “feelings of entitlement, either overt or covert”; (APA, 2013).

Other researchers have attempted to identify the overlap between ASD and personality disorders more broadly (Rinaldi et al., 2021). Their meta-analysis of prevalence studies suggested some overlap between ASD and personality disorders, meaning that people with ASD could also meet the criteria for a personality disorder. Consequently, the converse would also exist where people with personality disorders might meet the threshold for a

diagnosis of ASD if ‘’the enduring pattern is not better accounted for as a manifestation or consequence of any other mental disorder’’ according to the DSM-5 (APA, 2013).

Contemporary research has attempted to look at this in more granular detail exploring the overlap between ASD and specific personality disorders. This has largely focused on the overlap between ASD and EUPD (Dudas et al., 2017; May et al., 2021). Other research has attempted to determine the overlap between ASD and schizoid personality disorder (Cook et al., 2020). However, one area where empirical research is absent is on the overlap between NPD and ASD. Strunz et al. (2015) compared people with EUPD, NPD, and nonclinical controls to identify personality traits and personality pathology specific to adults with ASD. They found that nearly half (45%) of ASD patients met the criteria for a DSM-IV Axis II personality disorder diagnosis. This might have clinical importance as emerging research (Simard et al.,2023) on the relationship between narcissism and empathy found that empathy was moderated by sociodemographic and methodological factors found, in a meta-analysis. The authors suggest their results support the existence of differential empathy functioning patterns based on the components of narcissism. This indicates some possible overlap with the ASD literature where difficulties with empathy are deemed a core feature of ASD (Baron-Cohen & Wheelwright, 2004).

Overall, there seems to be variability in the prevalence numbers of NPD and ASD as well as strong emerging evidence indicating that personality disorders and ASD have some overlap in clinical symptomatology with comorbidity being elevated when compared to the neurotypical population. However, a gap remains in the literature related to NPD and ASD. Given that difficulties with empathy are operationalised in the diagnostic criteria for both conditions it would be pertinent to explore and understand this overlap further.

Aim/Questions

This systematic review aimed to examine what is known about the research considering both NPD and ASD.

1. What is the comorbidity of NPD and ASD worldwide?
2. What are the differences and similarities in empathy?
3. What are the differences and similarities in terms of gender in both conditions?

Methods

Firstly, a scoping review was carried out to find out what would be the most useful review in this area. There appeared to be a varying degree of data on prevalence as well as studies that completed gold-standard diagnostic assessments of NPD and ASD. Additionally, as part of developing the review question Patient and Public Involvement (PPI) meetings took place with professionals in Personality Disorder and ASD services. This included peer support workers with lived experience.

A systematic review was conducted. Before undertaking the review, the protocol was pre-registered in the international prospective register of systematic reviews of the National Institute for Health Research (PROSPERO) (registration number: CRD42023344498). The pre-registration included the scope of work as well as pre-registered eligibility criteria, search strategy and data analysis plan. This was made publicly available by being registered on PROSPERO. The protocol was developed, following the preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P), 2019 statement.

Study Selection

Part of the systematic review was objectively reviewing the validity of studies returned in the search to ensure they met the pre-registered inclusion criteria. Studies meeting all inclusion criteria were included in the review.

Table 1

Outline of study inclusion criteria

Inclusion criteria
Diagnosis confirmed by a gold standard psychometric test.
18 years and older.
Worldwide population.
Peer review journal.

Types of studies that could have been included were all quantitative studies including Randomised Control Trials (RCTs), between-group design, within-group design, cross-sectional, longitudinal studies including cohort studies that used a population of NPD or ASD. Diagnosis must have been made using a recognised international classification system.

The authors examined the research literature and NICE guidelines to define the reliability of the psychometric tools and then agreed on which tests could be determined as gold standard measures. For the diagnosis of NPD, the measures defined were the Structured Clinical Interview for DSM-5 Personality Disorders (SCID-5 PD) (American Psychiatric Association, 2016), including SCID- I and SCID II- versions. Neo Personality Inventory-Revised (NEO PI R) developed by Costa (1992) or the Dimensional Assessment of Personality Pathology (DAPP BQ) from Livesley and Larstone (2008).

Gold standard psychometrics for diagnosis of ASD must have used the Autism Diagnostic Observation Schedule (ADOS) by Lord et al. (2002), the Autism Diagnostic Interview-Revised (ADI-R) by Rutter et al. (2003) and, the more recently developed Diagnostic Interview for Social and Communication Disorders (DISCO) by Anglim et al. (2020) was included.

Self-report measures were used in addition to the gold standard which included at least one of the following: Autism Spectrum Quotient (AQ) Baron-Cohen et al. (2001a), the Reading the Mind in the Eyes test Baron-Cohen et al. (2001b), or the Empathy Quotient (EQ) developed by Baron-Cohen and Wheelwright (2004). Additionally, the Adult Asperger Assessment (AAA) by Baron-Cohen et al. (2005) which incorporates the AQ, EQ and a Relative Questionnaire (RQ) was also included. Yet, the AAA was not deemed a sufficient standalone classification tool as it is a screening tool used to determine whether further assessment of ASD is warranted. Furthermore, recent research from Adamou et al. (2022) found no evidence of accuracy for the AQ or the EQ when using the AAA to diagnose ASD and they recommended caution when interpreting the results of the AAA.

Table 2

Outline of study exclusion criteria

Exclusion Criteria
Restrictions were any articles that were not in the English Language (or had been translated into English).
Articles that were published before 1980.
Participants under the age of 18.
Participants without a diagnosis.
Participants where the method of diagnosis was unclear, could not be clarified or absence of a gold standard psychometric test.
Editorials, expert opinions, conference posters and unpublished thesis.

Searches

A systematic literature search was conducted using five databases: Medline, Web of Science, Cochrane Central Register of Controlled Trials (CENTRAL) in the Cochrane Library,

and PsycINFO. Searches were carried out on literature to identify existing articles. Medical subject headings (MeSH) terms were cross-referenced as part of the National Library of Medicine (NLM) controlled vocabulary thesaurus to use their indexing system to ensure that there are no other recognised terms used for NPD or ASD that could be used in the search strategy. There was not a MeSH category for NPD in MEDLINE, so the authors used only the free-word search. Further, trawling of the literature occurred through snowballing which included a manual search and cross-referencing of papers and authors to try and ensure all relevant literature was captured. Additionally, grey literature was searched for any additional studies that may have fit with the following criteria.

Boolean operators AND/ OR'S were used to expand search parameters to include all necessary terms. Electronic copies of the research papers were downloaded as PDF documents. The search was completed on 10 February 2023.

Table 3

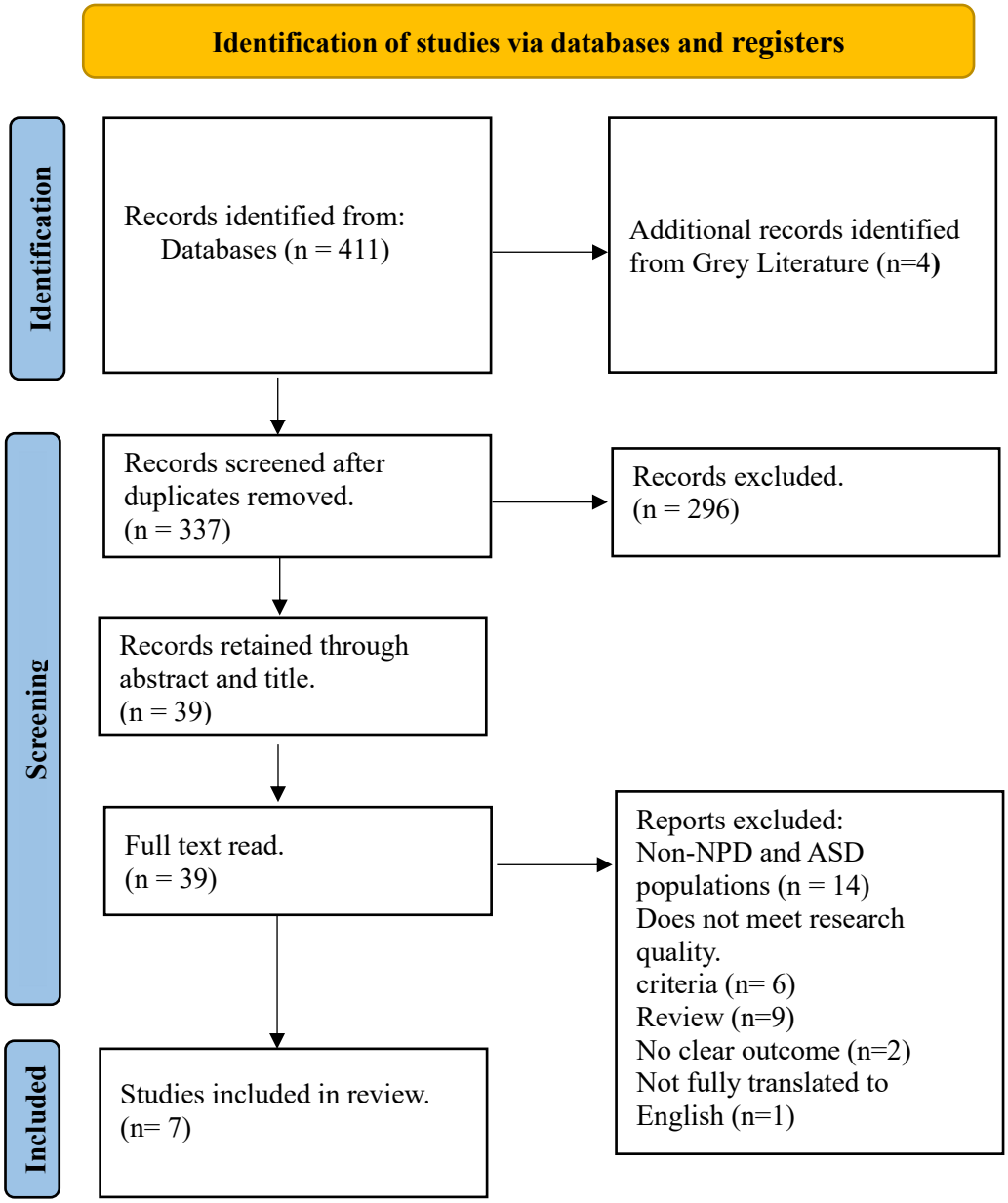
Outline of keywords identified.

Keywords
Narcissism
Narcissistic personality disorder
Autis* to encompass autistic spectrum disorder and condition.
Asperger*
Kanner* to encompass Kanners syndrome and disorder.
ASD
ASC
Empathy
Theory of Mind

Data Extraction

From each article selected, data was extracted regarding study characteristics. This included title, author, publication year, journal published in, country of study, study design, sample size, primary diagnosis, diagnostic criteria and tools, sample age range, sample gender, study period, diagnosis of NPD and ASD, and additional outcomes. The study selection process (see Figure 1) produced 411 results in total. Through searching grey literature four studies were added. 39 articles were identified for a full review. Of these, 32 did not meet our inclusion criteria. Seven studies were ultimately retained to be included in the data analysis. The reasons for studies being excluded are specified further below. This aligned with the inclusion and exclusion criteria.

Figure 1 *Study selection process*



Data Analysis

To evaluate the prevalence of NPD in, ASD populations and vice versa the plan was to carry out a systematic review and meta-analysis of odd's ratio as a measure of effect to determine how much higher the odds of exposure (of being diagnosed with NPD or ASD) are among participants in the research than the general population. Gender would be analysed as a covariate variable. A narrative synthesis was planned to present the differences and similarities of empathy. However, The difference between the study as intended and as

achieved was that it was not possible to gather prevalence data, so the data gathered was synthesised based on comorbidity, empathy and gender.

Results

Risk of Bias Assessment

The Appraisal tool for Cross-Sectional Studies (AXIS tool) developed by Downes et al. (2016) was selected for assessing the cross-sectional studies as it is suited to those designs. Furthermore, it is highlighted and cited in other peer-reviewed articles that appeared in similar reviews on the topic of the prevalence of ASD and personality disorder (Gillet et al., 2022). One study (Schulze et al., 2013) used an experimental design. The AXIS tool was used to determine the risk of bias. The rationale for this was that the structure of the AXIS tool mapped clearly to the study. This allowed for the authors to have a consistent tool to assess for risk of bias. It was identified that there would be differences in the cause-and-effect relationship in experimental designs and cross-sectional designs (where the variable and outcome are observed at one time). This was discussed with all raters so that this could be accounted for. Yet, aside from this difference, it was decided that the questions in the AXIS tool would be effective in assessing the risk of bias for this paper. All papers rated using this tool were deemed a low risk of bias.

Another risk of bias assessment used was the Critical Appraisal Skills Programme (CASP) tool (Critical Appraisal Skills Programme, 2018). This tool was selected for the Perry and Perry (2004) study instead of the AXIS tool. This was due to the longitudinal design rather than cross-sectional. It was deemed that the AXIS tool would not be able to effectively answer questions related to the longitudinal follow-up data. Therefore, the CASP cohort study checklist tool was deemed an acceptable tool to assess this paper. The CASP tool allows the researcher to classify the quality (or risk of bias) as high, moderate, or low. The Perry and Perry (2004) study was deemed a low risk of bias.

Inter-rater reliability

There were three raters in total. The primary researcher rated all papers in the first instance, and the second and third raters shared the total papers between them. Each paper had two raters. Inter-rater reliability for the quality scores was calculated with 100% of studies (n=7). Cohen's Kappa (κ) Cohen (1960) was calculated for each study. The Kappa scores for all papers in the review are presented.

Table 4

Kappa Scores for individual studies

Studies	Kappa Scores
Benítez Camacho et al. (2010)	κ =0.90 (almost perfect)
Marissen et al. (2012)	κ=0.89 (almost perfect)
Ritter et al. (2011)	κ=1.00 (almost perfect)
Soderstrom et al. (2005)	κ=0.88 (almost perfect)
Strunz et al. (2015)	κ=1.00 (almost perfect)
Schulze et al. (2013)	κ=1.00 (almost perfect)

Table 4 indicates all ratings between 0.81–1.00, this suggests an almost perfect agreement across all studies. The results of the risk of bias assessment were a κ =98% agreement overall between all three raters.

This review aimed to examine the epidemiology and specific overlap of NPD in ASD populations and vice versa. Further aims were to focus on the overlap of empathy that has been researched in both conditions. Gender differences were also explored. Firstly, the question of the reported prevalence and overlap of NPD and ASD worldwide was answered through data on the country of study and sample sizes. Secondly, the questions on the

differences and similarities in empathy and gender were answered through the study outcomes and collating reported data.

Even with carefully considered inclusion and exclusion criteria, the papers gathered included an unacceptable amount of heterogeneity. The data in this review were highly varied in their approach to the NPD ASD conditions and diversity in the population of people with ASD and NPD meaning there was clinical heterogeneity. This did not lend themselves well to a standardised effect size calculation due to the heterogeneity of the study design meaning that it was not possible to undertake a meta-analysis with the data collected. Consequently, high levels of heterogeneity contra-indicated meta-analysis; the data were therefore synthesised narratively.

Data Analysis

A narrative synthesis was conducted following the Popay et al. (2006) framework. Key data from the included papers were extracted and used to undertake a narrative synthesis. This started with identifying common themes across studies, and then links between studies were examined more closely to explore relationships in the data and assess the robustness of the synthesis product (Popay et al. (2006).

Study Characteristics

Seven studies met the inclusion criteria for this review. This encompassed 962 participants aggregated across studies. All studies meeting inclusion criteria were published between 2004 and 2015. Of these studies, six were studies of people with a diagnosis of NPD and the final one was a study which included people with diagnoses of both NPD and ASD.

Table 5

Key data of studies included

Study	Aims and *Findings*	Design	Diagnostic Tool Used	Primary Diagnosis	Study Location	N	Mean Age	Gender
Benítez Camacho et al. 2010	Which defence mechanisms are used in NPD? *Immature or primitive.*	Cross-sectional	DSM–IV–TR	NPD	Inpatient	227	27.1	Females 70% Males 30%
Marissen et al. 2012	Measure empathic ability in NPD. *NPD patients had impaired emotion recognition.*	Cross-sectional	SCID-II	NPD	Hospital outpatient	60	41.5	Females (0%) Males (100%)
Perry and Perry 2004	Examine psychodynamic conflicts and defences in NPD. *NPD associated with rejection, resentment and counter dependence.*	Longitudinal	DSM–III–R	NPD	Community	107	31.5	Females (55%) Males (45%)
Ritter et al. 2011	Assess cognitive and emotional empathy in NPD. *NPD patients did not show deficits in cognitive empathy.*	Cross-sectional	SCID-II	NPD	Inpatient and community	127	31.9	Females (61%) Males (39%)
Schulze et al. 2013	To investigate grey matter abnormalities in the anterior insula of NPD patients. *NPD patients had smaller GM volume in the left anterior (related to*	Experimental	SCID-II	NPD	Inpatient and outpatient	34	35.8	Females (29%) Males (71%)

	emotional empathy).							
Soderstrom et al. 2005	The extent of PCL-R correlates with mental and personality disorders (PDs). *Positive associations noted for autistic features, and Cluster B PDs.*	Cross-sectional	DSM-5 and SCID-II	NPD and ASD	Inpatient (forensic)	100	46.5	Females (8%) Males (92%)
Strunz et al. 2015	Identify personality traits and pathology specific to adults with ASD. *ASD showed a distinctive profile compared to NPD.*	Cross-sectional	ADOS, ADI-R, DSM-5.	NPD and ASD	Inpatient and outpatient	307	32.3	Females (49%) Males (51%)
Total						962		Females (48%) Males (52%)

Study Conclusions

There were a variety of aims and findings in the studies reviewed. Two studies specifically aimed to recruit both an NPD and ASD population, whereas the remaining five studies primarily recruited an NPD population. Two studies were papers that explored NPD from a psychodynamic perspective: Firstly, Benítez Camacho et al. (2010) was a psychodynamic study aiming to identify defence mechanisms in an inpatient sample with NPD. The authors found people with NPD used predominantly immature or primitive defence mechanisms. Secondly, Perry and Perry (2004) found that out of 107 subjects with borderline, antisocial, schizotypal personality and/or bipolar type 2 affective disorder were

rated for DSM–III–R NPD, yielding 7 with definite NPD and 27 with significant narcissistic traits. Also, NPD features were positively associated with the psychodynamic conflicts of rejection of others, ambition–achievement, dominant goal, resentment over being thwarted by others, and counter dependence, and negatively associated with the conflicts of the experience and expression of emotional needs and anger, separation abandonment and dominant other.

Comorbidity

In a forensic psychiatric population, Soderstrom et al. (2005) found that 18% of the sample met criteria for ASD, while 16% met criteria for NPD. Nevertheless, Strunz et al. (2015) who researched individuals with ASD without accompanying intellectual impairment suggested a distinctive personality trait and personality pathology profile compared to the two clinical samples of EUPD and NPD patients and to nonclinical controls.

Empathy

The remaining studies were more explicit about their foci on empathy. Marissen et al. (2012) examined the performance of patients with NPD on facial emotional recognition tasks finding that NPD patients generally performed worse on a facial emotion recognition task compared to both control groups. Schulze et al. (2013) found that relative to the control group, NPD patients had smaller Grey Matter (GM) volume in the left anterior insula with an effect size of $d = 1.09$. Independent of the group, GM volume in the left anterior insula was positively related to self-reported emotional empathy, yet there were no relations with cognitive empathy, which would mean having a more complete and accurate knowledge about the contents of another person's mind, including how the person feels. It is also known as empathic accuracy. An implication of this could be that people with a diagnosis of NPD may have difficulty connecting and responding to another's emotions in a time of distress.

This may appear to be a callous or odd response. While Ritter et al. (2011) posit that NPD patients did not show deficits in cognitive empathy. The final two papers appeared to suggest that there are different types of empathy researched across the literature and focused on attempting to identify a neurological basis for this.

Gender

While larger studies such as Benítez Camacho et al. (2010) which recruited 227 participants included more females than males (Females 70% Males 30%) and Strunz et al. 2015 also included a high proportion of females (49%) out of a sample of 307 there were more males overall perhaps due to one study that included males only.

Psychometrics

The studies meeting inclusion criteria had discrepancies in the psychometric tools used to confirm a diagnosis. In studies exploring ASD, there was more consensus and consistency with the ADOS, ADI-R diagnostic tools and DSM classification systems. Whereas papers exploring NPD varied more in the versions of the DSM used in classification, as well as the use of the NEO-PI-R which did not appear as popular.

Table 6

Diagnostic tools and classification systems used for NPD and ASD

Narcissistic personality disorder	Autistic spectrum disorder
NEO-PI-R	ADOS
SCID-II	ADI-R
DSM–III	DSM-5
DSM–IV	
DSM-5	

As table 6 shows, the version of the DSM used for NPD in particular varied. Whilst these were all under the umbrella of gold standard psychometrics as part of inclusion criteria there was more variability in the way that it was diagnosed. The implication for the synthesis of data was that it was more reliable to conclude from the ASD-focused papers given they were using the same diagnostic tools and classification systems, whereas with NPD more caution was warranted due to the diversity of measurement.

Study Quality

Determining study quality is a combination of numerous factors related to design, reporting, analysis and conclusions made. Melnyk and Fineout-Overholt (2022) purport that higher levels of evidence typically have less risk of bias. No RCTs met the inclusion criteria which are typically recognised as the gold standard for research design (Sackett, 1989). There was variance in the quality of the studies, such as Ritter et al. (2011) and Strunz et al. (2015) who used control groups which meant conclusions could more strongly be drawn. Challenges to study quality included Marissen et al. (2012) who only included male participants and Perry and Perry (2004) where nearly half of their sample dropped out. This meant that the studies retrieved in this search would not consistently be viewed as robust due to these

difficulties, and the variance in approaches to researching this topic creates difficulty in carrying out systematic review methods that require consistency for reliability. Moreover, there is a high bar for diagnostic criteria as inclusion criteria asked for gold standard assessments only. The finding from this review were that outcomes needed to be interpreted with a degree of caution considering the flaws in study design. This impacts the applicability of the findings as it may not be possible to generalise to a wider population of people with NPD and ASD.

Overall, the existing literature identified in this review makes it difficult to synthesise data on the overall prevalence between NPD and ASD. Additionally, when considering differences and similarities in gender the studies may not be able to give a 'true' reflection of the gender split with these conditions as there were more males overall and variability within each study; one study included males only. Nevertheless, studies do present different types of empathy and a suggestion of comorbidity with NPD and ASD, it is important to consider this further.

Discussion

This review aimed to examine the epidemiology and overlap of NPD in ASD and vice versa. It also focused on the overlap of empathy. Gender differences were also explored. Overall, the findings were that there were a small number of studies that used gold-standard psychometric tools to diagnose NPD and ASD. Instead, the broader term of narcissism, or traits of autism were used which therefore did not meet the criteria and were not included in the review. One finding we were able to observe was that a large proportion of research on NPD has been conducted in psychodynamic literature. This included Perry and Perry (2004) who found seven out of 107 participants met DSM–III–R criteria for NPD and NPD features were positively associated with psychodynamic conflicts. A critique of psychodynamic theory is that it is difficult to falsify i.e. when interpretations are made about defence mechanisms related to NPD and how prevalent this is. Additionally, forensic literature appears to be a popular place to publish NPD research. This is understandable as research suggests a low prevalence of NPD in adult nonclinical samples (Dhawan et al., 2010). This is likely due to people with an NPD diagnosis being less likely to access services as they may consider that support is not needed or unable to meet their needs. Therefore, when the NPD population do have contact with services it may be due to restrictions of the criminal justice system, rather than choice.

Nevertheless, historical research suggested that narcissism involves fragility and low self-esteem (Mollon, 1986) and that narcissism can be understood as encompassing both grandiosity and fragility (Di Pierro et al., 2019). Yet, this understanding of fragility and low self-esteem appears to have become less popular in recent literature. This leads to a risk of the trajectory of Narcissism and NPD being demonised. This lack of acknowledgement of fragility aligns with research from Yakeley, (2018) who argued that the DSM-5 diagnosis does not capture the vulnerable aspects of pathological narcissism. Therefore, research into the

vulnerable side of NPD is suggested to understand the differences and similarities in empathy. Schalkwijk et al. (2021) suggest an inclusion of psychodynamic concepts to further understand NPD and support a dimensional approach to NPD.

There were fewer studies with an ASD population included in the review in comparison to NPD. This is a limitation of the review as it impacts how applicable the findings are for people with an ASD diagnosis. Yet, in the last 40 years since Wing and Gould (1979) termed autistic spectrum disorder, research solely on ASD has progressed as it is plentiful. Therefore, it was a surprising finding in terms of the prevalence of ASD. Yet, the research that met inclusion criteria in an ASD sample was able to tell us a distinct personality trait and profile was present when compared to samples of EUPD and NPD. Additionally, rather than having a psychodynamic lens, ASD studies appear to be approached from a neurobiological perspective. This is fitting due to ASD being a neurodevelopmental condition. Overall, it appears that in the NPD and ASD studies which do exist, there is a different theoretical lens based on which is the primary condition being investigated. NPD studies often have a largely psychodynamic lens whereas ASD research papers need to take a neurobiological approach. This makes it harder to identify overlap given the research is approaching it from two very different perspectives.

Considering gender differences, research has suggested females are more likely than males to mask their symptoms of ASD, by mirroring other females' behaviours to 'fit in' or 'camouflage' in a neurotypical world (Allely, 2019). This is to fit societal expectations so that the person does not stand out and can include covering up 'stimming' behaviours that are usually used to soothe. This can mean that diagnosis may only be provided when social demands increase such as adolescence, new working environments or when other psychosocial stressors take place. Alaghband-Rad et al. (2023) note that the self-awareness of

challenges in social situations and the effort made to mask symptoms would lead to more negative emotional outcomes. The review aligned with previous literature as females were less prevalent, yet the percentage of females in this review was not substantial enough to make inferences.

In terms of NPD, it was clear that the percentage of males was much higher overall which aligns with what is known about the prevalence of men with an NPD diagnosis being high (Caligor et al., 2015). Also, in a large-scale study Stinson et al. (2008) purported that the prevalence of lifetime NPD was 6.2%, with rates greater for men (7.7%) than for women (4.8%), this suggests that NPD does impact females too. Yet, one of the NPD studies did not include any females in their sample which put research at risk of bias and created a need to be even more tentative about any implications suggested due to a lack of generalizability. In the introduction, it was noted that contemporary research has highlighted that the gender prevalence in EUPD is not as weighted towards females as previously thought. Yet, a large-scale worldwide systematic review and meta-analysis on personality disorder and gender is lacking. This would be a recommendation for future research. Furthermore, research into ASD in adults is a relatively new phenomenon and there is scant research of personality disorders in children as they cannot be diagnosed in children, meaning the overlap has previously been neglected in the literature.

It can be concluded that having difficulty in empathy was found to be common across diagnoses, yet the features of the empathy impairment differed between NPD and ASD. Furthermore, findings were that cognitive and emotional empathy differed, with NPD patients not showing deficits in cognitive empathy. Strunz et al. (2015) found that participants with ASD provided straightforward responses to empathy questions which might lead to results that make them appear less empathic relative to comparison groups. Yet,

Schulze et al. (2013) suggested that NPD patients had a smaller amount of grey matter in the left anterior insula area of the brain that was positively related to self-reported emotional empathy in clients with NPD. This suggests a correlation, yet not a causal relationship with a reduction in empathy with clients with NPD. The differences in empathy were apparent even in a small number of included studies. There is even more variability across different types of empathy across the research literature. This links with Baron-Cohen (2011) who suggested different types of empathy categorised into cognitive, emotional, and behavioural. Future reviews could be completed on just one area of empathy as the operational criteria and assessment methodology of the cognitive, affective and behavioural components of empathy looks different. For example, cognitive empathy could be tested, emotional empathy could be self-reported and behavioural empathy could be observed. This would mean that a further review of the types of empathy that are present or lacking in NPD and ASD could comprehensively define differences and similarities across the clinical presentations.

There remains a disparity between prevalence scores. This variability comes from inconsistency. Firstly, it remains difficult to operationalise NPD for research purposes as in wider studies researchers are likely to use the personality trait of narcissism or use a trait-based approach to describing NPD, rather than using a DSM-5 or DSM-5-TR diagnosis. Also, it is clear from the findings that there is variability in the psychometric measurements used in NPD. As mentioned, some studies not included in this review claimed to be researching NPD when their assessments could only deem a person to be high in trait narcissism. Narcissism alone does not meet the criteria for NPD, as a diagnosis of a personality disorder requires a person to be on an acute end of a spectrum of functioning, with pervasive difficulties being present.

Secondly, when considering the research on ASD populations, even though there was more consistency in tools used to diagnose; an inconsistency appeared in the application of the threshold for wider ASD literature in studies that did not use gold standard tools. It took careful analysis of the full-text studies to ensure that the participants in the research had received a comprehensive assessment. While carrying out an in-depth review into the research literature this led to findings that people had a self-reported diagnosis of ASD or had been assessed as having ASD traits based on screening tools only. These studies were not included in the review. Yet, this was not apparent when looking at the titles or abstracts of these studies, with these key details often embedded deep in the paper. Therefore, caution is warranted when including literature in a review which does not carry out comprehensive assessments before diagnosis. These disparities create difficulty in presenting the 'true' prevalence of both NPD and ASD. This unfortunately creates a large amount of clinical heterogeneity which is defined as differences in participant, treatment, or outcome characteristics or research setting. Furthermore, clinical heterogeneity in systematic reviews can significantly affect statistical heterogeneity leading to inaccurate conclusions and misled decision-making (Chess & Gagnier, 2016). Heterogeneity was highly evident in the data related to clinical diversity in the NPD and ASD populations. While inclusion criteria stated that studies must have recruited participants with a diagnosis of NPD or ASD using recognised psychometric assessments and clinical interviews different measures were used in diagnosis. Whilst it was expected that there may be some variability in diagnostic tools it was not known that variability in the tools and classification systems used in research studies would also be so apparent. Further exploration of psychometric tools used, and their psychometric properties led to a small number of identified studies that met the gold standard. To conclude, there is a large amount of poor quality research that fails to operationalise NPD and ASD.

Another critical issue in being able to meta-analyse prevalence is due to the types of study designs that are carried out in research. In terms of study quality, the risk of bias assessments found a high level of agreement with all three raters. There was a real lack of RCT studies that included participants with NPD and ASD.

In conclusion, it is difficult to confidently determine the actual overlap between ASD and NPD. This is due to a combination of limited research investigating this, differences in the quality of the papers, and diverging theoretical lenses to approach studies with NPD being more psychodynamically focused, whilst ASD studies are more neurobiologically focused. This further complicates the ability to identify overlap. Research does show a clear overlap in empathy between the two conditions, but interestingly these might map to different types of empathy. The findings allow us to conclude that an overall overlap does exist between NPD and ASD, although the quality of studies makes it difficult to accurately determine the exact prevalence of an overlap. Further research is recommended.

Implications for Practice

The findings and conclusions from this review suggest firstly, that clinicians need to be aware that a co-occurring symptomatology between NPD and ASD exists. Furthermore, clinically there is difficulty disentangling this. Emerging research has started to focus on subtypes of empathy, rather than empathy as a broad construct and this might be a useful framework for clinicians to help differentiate the presentations. However, there is not enough evidence at present to provide clear guidance for practice for how this should be operationalised and implemented.

In terms of the prevalence of both NPD and ASD, there are implications for clinical practice beyond diagnosis. This relates to clinicians needing to be mindful of how they approach interventions related to empathy for these two populations due to theoretically different approaches to understanding the challenges related to empathy that each presentation has. For example, when working with clients with ASD the theories are based on theory of mind (ToM) developed by Premack and Woodruff (1978) and are often more neurobiologically focused. The consequence is that this is carried through to intervention studies which are approached from a theory of mind deficit and aim to increase empathy through improving theory of mind skills. Whereas, when working with people with NPD to improve empathy, clinical interventions are often underpinned by psychodynamic theory. This means clinical interventions are more likely to have more relational focus as the mechanism for change in empathy-based interventions. Drawing this back to the research question, this then poses the question for clinicians; what do you prioritise clinically if a person has both clinical symptoms associated with NPD and ASD and an intervention related to empathy is indicated? Future research attempting to unpick and explore this further is warranted. A challenge for future research is how to position itself theoretically if NPD

continues to be viewed from a psychodynamic lens and ASD as a theory of mind/ neurobiological deficit, especially as there is an absence of standardised measures.

Finally, implications are related to diagnostic inflation which has implications for diagnostic credibility and accuracy of diagnoses. Whilst this is not unique to these presentations (McHugh et al., 2019) using a battery of diagnostic tests and shared decision-making with a team of diagnosticians would be of benefit. These concerns were evidenced by a large literature base excluded in this study often showing poor threshold and unreliable processes for diagnoses, i.e. diagnoses made on a short poorly validated self-report measure. Having more robust processes for including NPD and ASD in studies will produce more reliability and validity in intervention studies to address the common overlap of empathy deficits between the two conditions.

Accessible Summary

What is known on the subject;

- Empathy difficulties are discussed in diagnostic criteria for both NPD and ASD.
- Females are less prevalent in NPD than ASD. Yet Mirroring and masking means that females tend to be underdiagnosed with ASD.

What the paper adds to existing knowledge;

- Various types of empathy are researched in different studies. Research could be completed on just one area of empathy at a time to help differentiate between NPD and ASD.
- A large proportion of literature that exists on NPD and ASD does not use gold-standard psychometrics. This makes it challenging to infer wider clinical implications.

What are the implications for practice;

- Co-occurring symptomatology exists for NPD and ASD. Identifying when both conditions are present challenging.
- Considering empathy as subtypes (e.g. cognitive or emotional) might be a useful framework clinically for differentiating when there is overlap.
- Interventions for empathy are theoretically and clinically different for NPD and ASD.

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Chapter 3. Bridging Chapter

The systematic review has identified that an overlap exists between narcissistic personality disorder (NPD) and autistic spectrum disorder (ASD) a meta-analysis was not possible due to heterogeneity in studies. This meant that it has not been able to determine a reliable prevalence value. However, the systematic review was able to tell us more about the studies included. Findings were that most studies focused on NPD, and two focused on both NPD and ASD. It was also apparent that psychometric instruments and the quality of these used for diagnosis varied. Gender differences in the studies included in the review ascertained that males were more prevalent across studies. The overall discussion concluded that prevalence remains difficult to estimate due to variability in the psychometric tools used. An important point in the discussion was that empathy overlaps in both diagnoses, yet there are different types. The clinical implications suggested that when clinicians are working with co-occurring symptomatology carrying out in-depth developmental histories and aiming for shared decision-making would improve the care provided.

From this systematic review, the key finding is that even though NPD and ASD are separate diagnoses with underlying differences a similarity that they have is an empathy deficit. Given that, it was important to understand if deficits in empathy can cause social and psychological difficulties and to try and understand if these deficits can be treated or modified. Empathy is a difficult term to describe and understand conceptually. There are many different approaches to defining empathy Elliott et al. (2011). In psychological literature, the concept of empathy developed relevance after Carl Rogers emphasized it as an essential trait for therapists in successful psychotherapy (Gladstein, 1983). Numerous definitions of empathy exist. One of the most common definitions is “the ability to share someone else's feelings or experiences by imagining what it would be like to be in that person's situation” (Cambridge University Press, n.d.). Baron-Cohen (2011) has suggested

that there are different types of empathy categorised into cognitive, emotional, and behavioural.

In the systematic review, one of the closing conclusions was that studies using NPD and ASD populations often have a low bar for diagnostic inclusion such as poorly validated self-report measures. This then has implications for studies that focus on interventions. The one area of overlap diagnostically between NPD and ASD is deficits in empathy. This has been of interest to researchers who have attempted to develop interventions focused on improving empathy. A challenge for exploring interventions for empathy across NPD and ASD as shown in the systematic reviews is that the literature approaches these from very different theoretical lenses. Empathy in NPD is viewed as a relational-driven deficit often drawn from psychodynamic literature. ASD on the other hand is driven by a theory of mind deficit often seen as having neurobiological differences. The difference in these theoretical approaches means any attempt to conduct a meta-analysis to determine the effect size of interventions aimed to improve empathy in ASD and NPD will not be possible due to the heterogeneity that will inherently be present. Therefore, interventions aiming to increase empathy need to be reviewed separately.

The existing literature on NPD has paid less focus to attempting to treat or modify levels of empathy. Hopefully, this will change in future, but at present the relatively limited data makes it difficult to undertake a meta-analysis. However, interventions addressing empathy in ASD have held research interest for a longer period and as such there is a more established literature. However, closer examination of this literature shows that the existing research has mostly focused on children and adolescents with ASD and treating empathy deficits here. This indicates that empathy interventions for adults with ASD are less well understood. Research in ASD then, has been privileged and has become the focus instead of

the NPD literature. Interventions with a focus on increasing empathy have already been found to be effective in the child and adolescent population. Chung and Ghinea (2022) suggest a phased strategy for teaching empathy to children with ASD through a digital intervention. Holopainen et al. (2019) support the use of theory of mind training as an intervention for ASD.

Furthermore, there was already developing literature for ASD that linked with empathy interventions, but it leaned towards a neurobiological and medical approach. There was research that found that oxytocin had a small, significant effect on the theory of mind (Keech et al., 2018) in participants with a range of neurodevelopmental disorders. Aoki et al. (2014) used functional magnetic resonance imaging to test the hypothesis that oxytocin improves deficits in inferring others' social emotions. They found that oxytocin enhances the ability to understand others' social emotions in autism spectrum disorder at both the behaviour and neural levels. However, there was a clear gap in the literature for a review of non-pharmacological approaches exploring non-pharmacological interventions to increase empathy in adults. Therefore, a meta-analysis was carried out to understand this. The purpose of the systematic review and meta-analysis of non-pharmacological empathy interventions in adults with ASD was to combine studies that met the inclusion criteria to aggregate an effect size of empathy interventions to understand the effectiveness of non-pharmacological interventions in adults with ASD.

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Chapter 4. Empirical Paper

A Systematic Review and Meta-Analysis on the Effectiveness of Non-pharmacological Interventions to Increase Empathy in Adults with Autistic Spectrum Disorder.

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Abstract

Background: Autistic Spectrum Disorder (ASD) is a neurodevelopmental condition. Researchers have attempted to determine the relationship between empathy and ASD. Definitions of empathy vary, with more recent definitions proposing subtypes of empathy. There is evidence to suggest interventions to increase empathy can be successful. Aim: This meta-analysis aimed to determine whether psychological and social interventions for increasing empathy are successful in adults with a diagnosis of ASD. Research question: what is the effectiveness of non-pharmacological interventions in increasing empathy in adults on the autistic spectrum? Methods: A systematic review and a random effects meta-analysis were conducted on quantitative studies using either between-groups or within-groups design for non-pharmacological interventions to increase empathy in adults with ASD. Results: This resulted in data on 11 studies and 257 participants. There was a moderate effect size for interventions, but the difference between the intervention and control groups was not significant. Pre- and post-data results were on the cusp of significance. Conclusions: further research in this area is warranted. Future research would benefit from defining empathy within subtypes rather than globally whilst camouflaging should be considered in self-report empathy outcome measures.

Keywords: Autism; Autistic Spectrum Disorder; Empathy; Intervention; Therapy; Theory of Mind.

1. Introduction

This paper aimed to review the evidence for non-pharmacological interventions to treat deficits in empathy that can exist in autistic spectrum disorder (ASD). There is debate on the correct and preferred terminology to describe this set of symptoms including 'autistic', 'on the autism spectrum' and 'someone with autism' NHS England, (2023). For this paper, the term ASD has been consistently used. This is in line with the current preferred terminology in diagnostic and classification manuals.

Autism first appeared in the International Classification of Diseases, Eighth Revision (ICD-8) (World Health Organisation, 1967). The diagnostic terminology referred to “infantile autism” and appeared under the schizophrenia grouping (Ousley & Cermak., 2014). Subsequently, autism was later recognised in the Diagnostic and Statistical Manual of Mental Disorders (3rd ed., DSM-III, American Psychiatric Association, 1980). This established autism as a separate diagnosis describing it as a “pervasive developmental disorder”. To note developmental disorders are impairments in a child's physical, cognitive, language, or behavioural development which can impact everyday functioning and usually last throughout a person's lifetime.

Parallel to appearing in DSM-III, Wing and Gould (1979) coined the term autistic spectrum disorder (ASD) to reflect a broader understanding of the disorder to incorporate Asperger’s syndrome, high-functioning autism and severe autism. Presently, ASD exists in both current versions of the Diagnostic and Statistical Manual of Mental Disorders (5th ed., text rev.; DSM-5-TR; American Psychiatric Association, 2022) and the International Classification of Diseases, the ICD-11 World Health Organization, (2022). The concept of the ‘Triad of Impairment’ developed by Wing and Gould (1979) posits that autistic people have difficulties with communication skills, social interaction, and imagination. Moreover, due to a

large social movement of autistic people and developments in research, the label of ASD and the 'disorder' approach is increasingly becoming understood and described by medical professionals and the public to be a neurological disorder which impacts development in childhood and is, therefore, a neurodevelopmental disorder. ASD is also understood to be a neurodiversity meaning that the variety of ways we think, learn, feel and process information differ depending on the individual.

When considering the impact of ASD more widely, research on the global burden has been researched. Large-scale global burden of disease studies were carried out consecutively to systematically describe the epidemiology of a wide array of major diseases, injuries and risk factors (Institute for Health Metrics and Evaluation, 2010; 2013; 2019). Global burden is terminology most suitable for physical health conditions, yet, it has also been used to explore the impact of mental health conditions. While ASD is not a mental health condition, there is a plethora of research on the comorbidity of ASD and conditions such as anxiety and depression. Hollocks et al. (2019) in a review of adults with ASD found the pooled estimation of current and lifetime prevalence for adults with ASD were 27% and 42% for any anxiety disorder, and 23% and 37% for depressive disorder. Additionally, Kularatna et al. (2022) noted that neurodevelopmental disorders often require multiple services, including support for families, accommodation, special educational interventions, social services, and healthcare which is associated with what they describe as a substantial societal burden. Baxter et al. (2015) attempted to estimate the global burden of disease of ASD. Using a meta-regression approach, they calculated the burden by using measures such as years lived with disability (YLDs) and disability-adjusted life-years (DALYs). YLDs and DALYs were terms and ways of measurement derived from the World Health Organisation (WHO) on health data. The researchers concluded that ASD accounts for substantial health loss across the lifespan and that understanding the burden of ASD is essential for effective policymaking.

Numerous study designs have been undertaken by researchers attempting to summarise and capture accurate data on ASD epidemiology. A recent review of worldwide epidemiological surveys of autism was conducted by Fombonne et al. (2021). The study looked at prevalence in 141 surveys in 37 countries (provided where only two out of 141 surveys focused specifically on adults). Prevalence results were heterogeneous and ranged from 0.043% to 2.68% and case definition and case status determination were noted to remain a challenge. One area where this increase in research has focused is on the relationship between ASD and empathy. Empathy overlaps with theoretical concepts such as Theory of Mind (ToM) developed by Premack and Woodruff (1978) who described ToM as the cognitive capability of understanding another's mind. More recently the concept of mentalizing (Fonagy & Bateman, 2006) which focuses on understanding or making sense of other people's mental and emotional states as well as understanding our own, has been noted to require empathy. More recent definitions of empathy have proposed different types of empathy. The common subtypes of empathy proposed in the literature include cognitive and emotional empathy. The difference is that emotional empathy concerns the ability to understand another's thoughts and feel them, whilst cognitive empathy means understanding how another person feels or mental perspective-taking (Smith, 2006). Vegni et al. (2012) suggested that overlap exists between cognitive and affective components of empathy as well as mentalization.

Theoretically, the literature suggests that people with ASD might have a deficit in cognitive empathy. Research suggests that ASD compared to people without ASD had impairments in cognitive empathy (Shirayama et al., 2022). Yet, research from Smith, (2009) has suggested a higher-than-average ability to empathise emotionally. This idea was named the ‘Empathy Imbalance Hypothesis (EIH)’ and may provide further insights into empathy in people with ASD. Consistent with this, studies including people with ASD have found that

they can experience other people's emotions more intensely, Kimber et al. (2023) described this as a hyper-empathic experience. Additionally, this intense connection with other people's emotions has been reported to be so challenging that it has been purported to lead to these individuals feeling a strong need to shut off from that feeling Dugdale et al. (2021). Yet, the implication could be that is that shutting oneself off, could in turn be misunderstood as being a lack of empathy. Moreover, Song et al. (2019) conducted a meta-analysis on empathy impairment in individuals with ASD on a sample of 2,095 people with ASD and 2,869 controls. Findings were that empathy in the ASD group was component-specific (between being contextual or stable over time) suggesting that there is not an overall deficit in empathy. The authors concluded that future research should clarify which subtype of empathy is included in studies. Additionally, gender was found to be a covariate of empathy impairment, yet culture was not. Whilst this research is comprehensive in size and considers covariate factors, it brings the challenge of how to measure empathy within research.

When measuring empathy, various research groups have developed numerous psychometric tools to measure empathy. Similar tools exist to measure constructs including empathy such as ToM and mentalizing. A number of these are freely available to the research community or for clinicians to use. Versions also exist that are available for children and adolescents. Perhaps the most widely used test in empathy is the Empathy Quotient (EQ) a 60-item (or abbreviated 40-item) self-report measure of empathy in adults (Baron-Cohen & Wheelwright, 2004). Clinically, the EQ has been used to measure empathy in autistic people but can also be used in the general population. Other commonly used measures include the, “Reading the Mind in the Eyes” test (Baron-Cohen, 2001a). This is a widely used test to measure a person's ability to hold a ToM or the ability to recognize the thoughts and feelings of others.

A critique of studies researching empathy is that in nearly half of the studies reviewed, the empathy scale used did not align precisely with the theoretical definition of empathy that the author provided (Hall & Schwartz, 2019). Stosic et al. (2022) suggested this might be because researchers might not be aware of what each empathy scale measures when designing studies.

In terms of interventions, NICE guidelines exist for treating adults with ASD (NICE, 2021). This suggests interventions for autism should include individual-supported employment programmes. Furthermore, guidelines recommend psychosocial interventions that include group-based social learning programmes focused on improving social interaction and they recommend the Adult Asperger Assessment (AAA; includes the Autism-Spectrum Quotient [AQ] and the Empathy Quotient [EQ]) to aid more complex diagnosis and assessment for adults. It also recommends using information from a family member, partner, or carer to ascertain whether the person has limited social demonstration of empathy.

Empirical evidence specifically regarding treatments for empathy has been reviewed by Teding van Berkhout et al. (2016). Their review and meta-analysis of 19 randomised control trials examined empathy training programmes. The researchers found overall significance and a medium effect size ($g = 0.63$) existing for empathy-based training programmes. Even after adjustment for estimated publication bias, a medium effect size remained ($g = 0.51$). This finding suggests that the ability to understand and share the feelings of another can be taught in empathy training programmes. However, a limitation of this research is that it reviewed studies with a sample of health professionals and university students. Therefore, it is not known whether empathy training programmes are effective for conditions which might have lower baseline levels of empathy such as adults with ASD.

The existing research has predominantly focused on empathy interventions in children and adolescents rather than on adults. Given routine diagnosis of ASD has only happened in the last 30 years it means there is likely a cohort of adults who have been diagnosed in adult life and will not have been offered interventions to increase empathy in adolescence and childhood. Therefore, a gap in the literature exists as to whether psychological and social interventions can increase empathy in autistic adults. Consequently, this paper aims to find out whether current interventions (including psychological and social) are increasing empathy in adults who have a diagnosis of ASD. This specific research question investigated is what is the effectiveness of non-pharmacological interventions to increase empathy in adults with ASD?

2. Methods and Materials

A scoping review was carried out to identify and understand the current literature. Concurrently, Patient and Public Involvement (PPI), meetings took place with professionals in an ASD service this included peer support workers with lived experience to help refine the question. This indicated that there appears to be a gap in the literature on empathy interventions in adults with an ASD diagnosis.

A systematic review was conducted to objectively review studies meeting inclusion criteria and synthesise the research literature. The systematic review protocol was developed, following the preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P), 2019 statement. This systematic search protocol included eligibility criteria, a search strategy and an analysis plan that was pre-registered and publicly available on PROSPERO (registration number: CRD42024492640).

2.1 Study Selection

The PICO framework was used to classify the research question and the inclusion and exclusion criteria implemented. This is a commonly used tool to structure systematic reviews Schardt et al. (2007).

Table 1

PICO Framework

PICO	
P: Population of Interest	Adults diagnosed with Autistic Spectrum Disorder.
I: Intervention	Non-pharmacological interventions to increase empathy.
C: Control	Compare with control/active group intervention.
O: Outcome	Empathy scores.

Table 2

Outline of study inclusion and exclusion criteria

Inclusion Criteria
English or translated into English.
Solely adult participants.
Papers published after 1980.
Diagnosis of ASD using validated psychometrics.
Non-pharmacological intervention.
Exclusion Criteria
Any participants who are children or adolescents (under 18 years old).
Participants without an ASD diagnosis.
Pharmacological or medical interventions such as (medication or brain scanning).
Editorials, expert opinions, conference posters and unpublished thesis.

Types of studies that could have been included were all quantitative studies including Randomised Control Trials (RCTs), between-group design, within-group design, cross-sectional studies, and case series research. The studies must have compared the intervention to a control or another treatment option or carry out a pre-post study design. The types of studies that were not included were qualitative papers, reviews, and single case studies and thesis.

The authors examined the research literature and NICE guidelines to define the reliability of the psychometric tools. Agreement was then made with authors on which tests could be determined as gold standard measures. This resulted in the criteria that studies must have recruited participants with a diagnosis of ASD using recognised psychometric

assessments and clinical interviews as specified in the recognised classification systems of the Diagnostic and Statistical Manual (DSM- IV and 5 (APA, 1994;2013) and International Classification of Diseases (ICD) 10 and 11 (WHO, 2016;2022). These were the Empathy Quotient (EQ) Baron-Cohen and Wheelwright (2004); The Reading the Mind in the Eyes test Baron-Cohen et al. (2001a); the Autism Spectrum Quotient (AQ) Baron-Cohen et al. (2001b); Autism Diagnostic Observation Schedule (ADOS) Lord et al. (2002); the Autism Diagnostic Interview-Revised (ADI-R) Rutter et al. (2003); The Diagnostic Interview for Social and Communication Disorders (DISCO) Anglim et al. (2020).

2.2 Searches

A systematic literature search was conducted using the following five databases: Medline, Web of Science, Cochrane Central Register of Controlled Trials (CENTRAL) in the Cochrane Library, and PsycINFO.

The search terms used were deemed appropriate when exploring research in related areas. Searches were carried out on literature using a combination of controlled vocabulary and free-text terms to identify existing articles. Additionally, the authors consulted medical subject headings (MeSH) terms that were referenced from part of the National Library of Medicine (NLM) controlled vocabulary thesaurus and used their indexing system. This was to ensure that there are no other recognised terms used for ASD, empathy, therapy, or intervention that could be used in the search strategy. Further, trawling of the literature occurred through snowballing which included a manual search and cross-referencing of papers and authors to try and ensure all relevant literature was captured. These actions resulted in the following combined search terms.

Table 3

Search terms combined

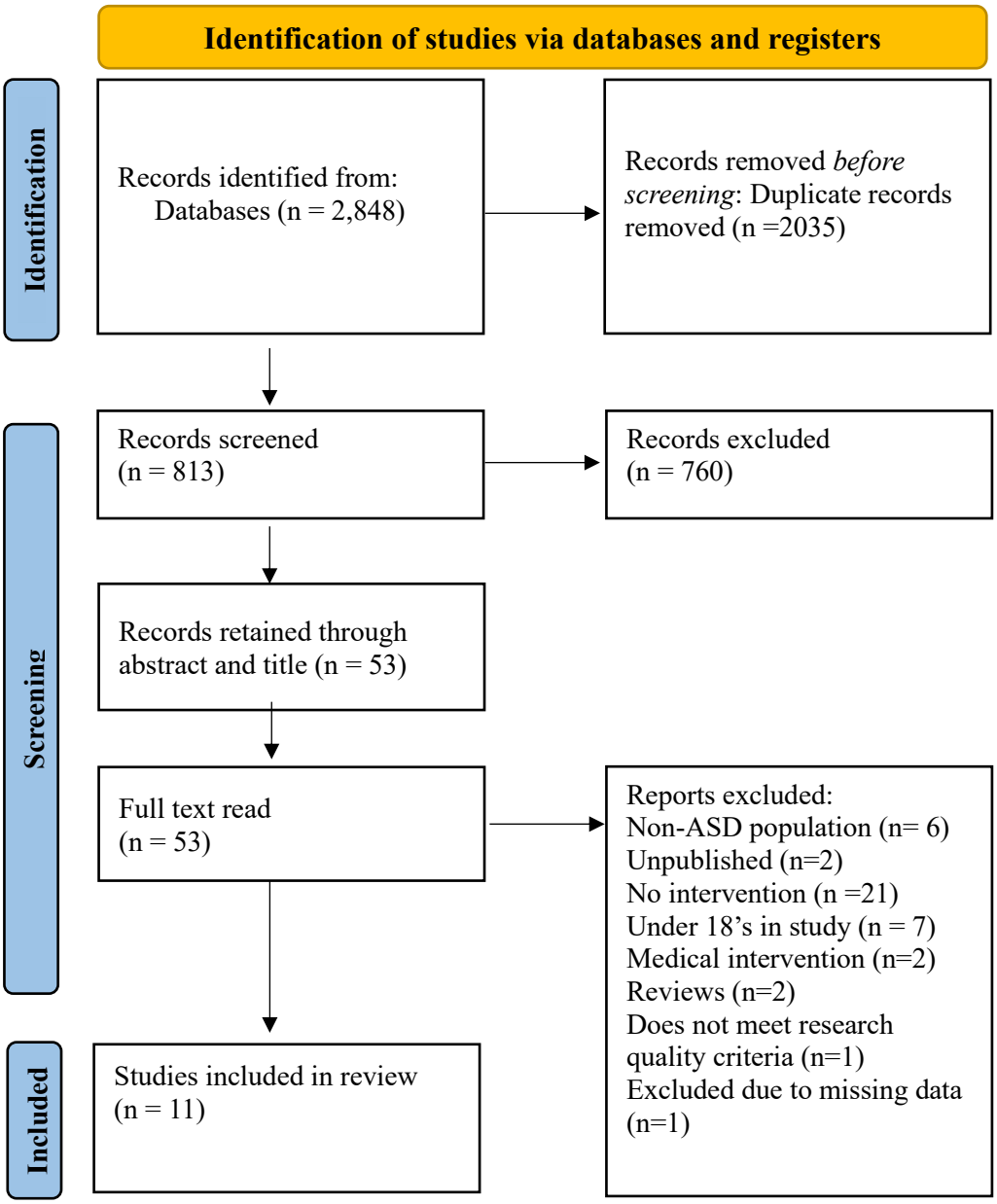
1.	(Autis* OR Asperger* OR Kanner* OR ASD OR ASC)
2	OR Mesh Term ASD
3	(‘’theory of mind’’ OR TOM OR empathy)
4.	(therap* OR psychotherapy OR ‘’behavioural therapy’’ OR counsel* OR intervention)
5.	OR Mesh term therapy
	1 OR 2 AND 3 AND 4 OR 5

This resulted in the following search string: (Autis* or Asperger* or Kanner* or ASD or ASC) and (‘’theory of mind’’ or TOM or empathy) and (therap* or psychotherapy or ‘’behavioural therapy’’ or counsel* or intervention).

Restrictions were articles not published in English (or where a translation to English did not exist) and articles published before 1980 (when ASD was first recognised in DSM-III). Additionally, the limiters ‘’Txt All Text’’, ‘’tw.’’ (text word) or ‘’all fields’’ were used to search the databases. This method of searching was used in the final search for all databases. Subsequently, the database searches were completed on 29 December 2023. For the search strategy and study selection this review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2019 guidelines (See Figure 1).

Figure 1

Study selection process



A data extraction database was used to record the following items of interest for inclusion in the meta-analysis; (a) article details (for example, author, publication year, title, journal), (b) study design, setting and recruitment method, psychometric used for diagnosis of ASD, type of empathy scale used (c) sample description (including number eligible to take part, sample size), dropout rate (d) demographic information (sample population description, mean age and age range of adults with ASD, gender). Effect sizes if provided, or alternative statistics necessary to compute effect sizes).

2.3 Data Analysis

A quantitative synthesis was planned to carry out a random effect meta-analysis. The analysis was conducted using the IBM SPSS Statistics (Version 27) software package and in R using the Metafor package (v2. 4-0; Viechtbauer, 2010). A random effects model was used as this model assumes that there is real variability in the data and is, therefore, more conservative than Cohen's D. This means that random effects are more appropriate in psychological research because heterogeneity should be assumed. Furthermore, random effects models are also deemed most suitable, compared to fixed effects models, for meta-analyses in mental health research (Cuijpers, 2016). Therefore, a random effects model was selected to analyse the research literature on ASD and empathy interventions as a large amount of variation in effect sizes was expected, given the varied interventions and empathy measurement tools used.

In terms of the meta-analysis, it gathered a mean and standard deviation to summarise effect sizes. It gathered a weighted average and used 95% Confidence Intervals. The measure of effect for the main outcome (empathy measure) was a Standardised Mean Difference (SMD). It expressed the size of the intervention effect in each study relative to the variability observed. Hedge's (g) was used to measure effect size which gives us an idea of how much the two groups differ. It was used as it corrects a bias of Cohen's d that is possible when the sample sizes between two groups are not equal and small. When a study used multiple outcome measures that were relevant, a pre-defined hierarchy was used as suggested by (Cuijpers, 2016). This helped to decide which instruments were included. The system used was that the most used, or best validated was chosen first, if that instrument was not available the second most used or best validated was planned to be selected. The outcome of the data analysed is presented in the following section.

3. Results

3.1 Risk of Bias Assessment

The ROB-2 tool developed by Sterne et al. (2019) was selected for assessing the randomised control studies. It was deemed to be a well-established and reliable tool and recent research from Minozzi et al. (2022) had suggested increased reliability following changes to instructions. The ROB-2 tool was well suited to the design, namely the randomised controlled trials that were included in the review. Furthermore, it has been widely used in other reviews, but importantly it has also been utilised in other recent reviews in the ASD literature. For example, Choi et al. (2024) used the ROB-2 tool in a review that also included a similar intervention to the current review, namely, they used the ROB-2 to summarise pharmacological and non-pharmacological interventions in ASD.

Table 4

ROB-2 results table

Study	D1	D2	D3	D4	D5	Overall
Chien et al. 2023						
Gantman et al. 2012						
Koehne et al. 2016						
Laugeson et al. 2015						
Platos et al. 2023						
Turner Brown et al. 2008						

*Overlap refers to disagreement between raters

Domains:

D1: Randomisation process.
D2: Deviations from intended outcomes.
D3: Missing outcome data.
D4: Measurement of the outcome.
D5: Selection of the reported results.

Judgement:

Low

Some concern

High

For non-randomized studies, the ROBINS-I was selected. Designed by the same authors as the ROB-2, the ROBINS-1 supported consistency across the risk of bias rating tools and is specifically a tool for assessing the risk of bias in non-randomized studies Sterne et al. (2016). The ROBINS-I tool has also been used in other reviews that also include an ASD population (Lumbreras-Marquez et al., 2022: Albhaisi et al., 2022). This helped to strengthen the decision to use this tool to assess the risk of bias in the non-randomised studies.

Table 5

ROBINS-I Risk of Bias assessment table

Study	D1	D2	D3	D4	D5	D6	D7	Overall
Kandalaft (2013)								
Kern Koegel et al. (2016)								
Kraemer et al. (2021)								
Tate et al. (2023)								
Van Pelt et al. (2022)								

*Overlap refers to disagreement between raters

Domains:

D1: Bias due to confounding.
D2: Bias due to selection of participants.
D3: Bias in classification of interventions.
D4: Bias due to deviations from intended interventions.
D5: Bias due to missing data.
D6: Bias in measurement of outcomes.
D7: Bias in selection of the reported result.

Judgement:

Low
Moderate
Serious
Critical

The ROBINS-I tool allows the researcher to classify the quality (or risk of bias) as low, moderate, serious, or critical. All five studies included were rated as having a serious risk of bias.

3.2 Inter-rater reliability

Three raters reviewed the papers. The primary researcher rated all papers with the second and third raters rating the sample between them. Therefore, all papers were double rated. Inter-rater reliability for the quality scores was calculated with all studies (n=11), which indicated κ =71% across all domains. Cohen's Kappa (κ) Cohen (1960) was calculated for agreement for each study. The Kappa scores for all papers in the review are presented below.

Table 6

Kappa Scores for individual studies

Studies	Kappa Score
Chien et al. 2023	κ= 0.61 (moderate agreement)
Gantman et al. 2012	κ=1.00 (almost perfect agreement)
Kandalaft, 2013	κ= 0.35 (fair agreement)
Kern Koegel et al. 2016	κ= 0.29 (fair agreement)
Koehne et al. 2016	κ= 0.75 (moderate agreement)
Kraemer et al. 2021	κ=1.00 (almost perfect agreement)
Laugeson et al. 2015	κ= 0.67 (moderate agreement)
Platos et al. 2023	κ= 0.33 (fair agreement)
Tate et al. 2023	κ= 1.00 (almost perfect agreement)
Turner-Brown et al. 2008	κ=1.00(almost perfect agreement)
Van Pelt et al. 2022	κ=1.00(almost perfect agreement)

This indicates that nearly half of the studies were rated at $\kappa=1.00$ which suggested a perfect agreement for those studies, yet the remaining six studies had more variability in the agreement between raters.

3.3 Study Characteristics

Initially, 12 studies were identified to be included in the review. In attempting to extract key data (Mean and Standard Deviation for the empathy measure for the between-groups analysis) it became apparent that this data was absent in Cunningham et al. (2016). To try and rectify this the lead author contacted the corresponding author via email to ascertain whether it was possible to provide the missing data. However, this request did not receive a response and we were therefore unable to include this study. Consequently, the review proceeded with the inclusion of 11 studies, with a pooled total of 257 participants. Six studies used a between-group design, and the remaining five studies were within group design.

Table 7

Study Characteristics

Study	Aims and *Findings*	Design	N
Chien et al. 2023	Investigate the effectiveness of the PEERS intervention in Taiwanese young adults with ASD. *Effective improvement found in social functioning in Taiwanese young adults with ASD.*	RCT	82
Gantman et al.2012	Test effectiveness of PEERS for Young Adults with high-functioning young adults with ASD. *Young adults reported significantly less loneliness and improved social skills knowledge.*	RCT	17
Kandalaf 2013	Investigate the feasibility of an engaging Virtual Reality Social Cognition Training intervention focused on enhancing social skills, social cognition, and social functioning. *Significant increases in social cognitive measures of theory of mind and emotion recognition, as well as in real-life social and occupational functioning were found post-training.*	Pre-post	8
Koegel et al. 2016	Examine the effectiveness of a video-feedback intervention with a visual framework component to improve verbal empathetic statements and questions during conversation for adults with ASD. *All participants improved in verbal expression of empathetic statements and empathetic questions and improved in their level of empathy and confidence in communication skills.*	Pre-post	3
Koehne et al. 2016	Establish the efficacy of an imitation- and synchronization-based dance/movement intervention (SI DMI) in fostering emotion inference and empathic feelings in adults with ASD. *Patients treated with SI-DMI showed a significantly larger improvement in emotion inference, but not empathic feelings.*	RCT	51
Kraemer et al. 2021	Feasibility and effectiveness of Mentalisation Based Therapy group for ASD. *Found a high acceptance of the treatment and an improvement in the patients' mentalizing abilities.*	Pre-post	18
Laugeson et al. 2015	Replication trial to test the effectiveness of PEERS, a caregiver-assisted social skills program for high-functioning young adults with ASD. *Treatment group improved significantly in overall social skills, frequency of social engagement, and*	RCT	21

	social skills knowledge, and significantly reduced ASD symptoms related to social responsiveness.		
Platos et al. 2023	Investigate the effects of the Polish adaptation of the curriculum on the social functioning of adults on the autism spectrum. *The intervention was well-accepted and deemed feasible by young adults, their parents, and peers involved in the program.*	RCT	15
Tate et al. 2023	Evaluate the feasibility and efficacy of a Cognitive Behavioural Social Competence Therapeutic Intervention for Adults with Autism (CBSCTI-A). *Results support feasibility and young adults with autism experienced significant improvements in social motivation, non-verbal conversation, emotional empathy, assertiveness, interpersonal relationships and self control.*	Pre-post	5
Turner-Brown et al. 2008	Evaluate the feasibility and utility of a group-based cognitive behavioural intervention to improve social-cognitive functioning in adults with autism. *Feasibility was supported and participants showed improvement in theory-of-mind skills and social communication skills.*	Quasi-RCT	11
Van Pelt et al. 2022	Evaluate the feasibility and acceptance by participants and therapists of the Dynamic Interactive Social Cognition Virtual Reality (DiSCoVR) for adults with autism. *Most participants and therapists found the VR intervention acceptable and feasible.*	Pre-post	26
Total			257

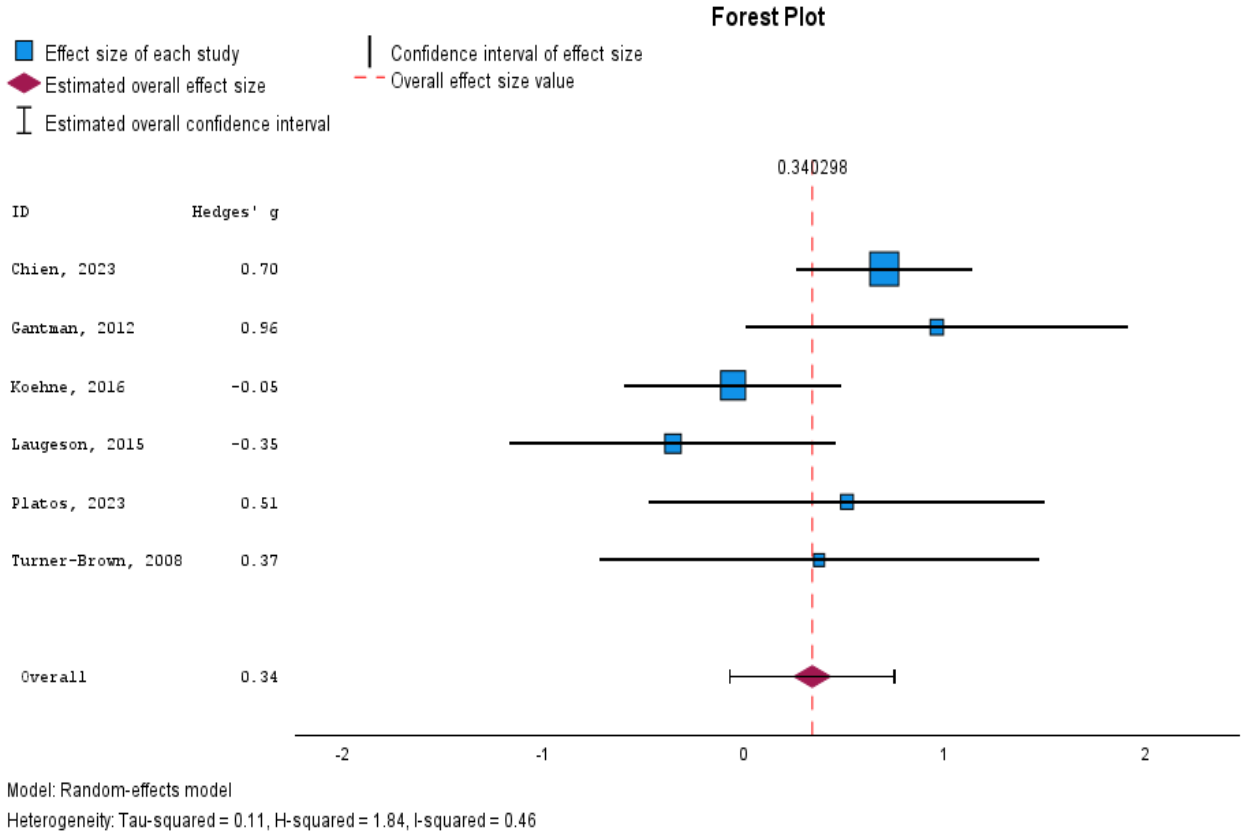
3.4 Primary Findings

Meta-analysis Between Groups Design

A random effects meta-analysis was carried out using SPSS to assess the amount of change between the intervention groups and the control groups (See Figure 2 for the forest plot).

Figure 2

Forest plot between groups data



Overall, there was a medium Hedges (g) effect size, yet the results were non-significant. (g=.34, (95% CI -.069, .750), p=.103). This meant that whilst there was a moderate effect size for interventions for empathy in ASD, this fell outside of significance when these were compared to control interventions. In several studies, the control was an active intervention.

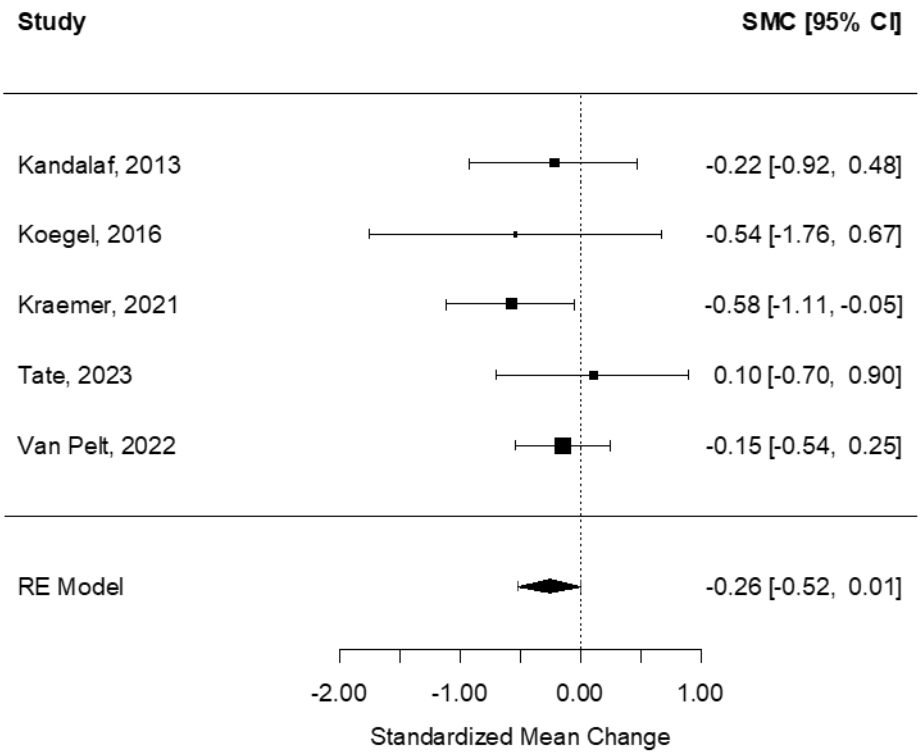
Unfortunately, a moderator analysis was not possible. This was based on the recommendation that there should be at least four studies in each subgroup and 10 overall (Higgins et al., 2023). Additionally, Cuijpers et al. (2021) suggested that a subgroup analysis requires 3 to 4 times the number of studies that are needed for the main analysis to have sufficient power. This number of studies increases exponentially with decreasing effect sizes and when the studies are not evenly divided over the subgroups.

Meta-analysis Pre-Post-Design

A random effects meta-analysis in R using the Metafor package was conducted to assess the amount of change within individual groups before and after the treatment intervention (See Figure 3 for the forest plot).

Figure 3

Forest plot for pre-post data



Findings were non-significant at .06 but close to significance at .05. The implications of this are outlined in the discussion. There was no heterogeneity. Q(df = 4) = 2.74, p-val = 0.60. There was a small effect, but it was non-significant. Yet the effect is stable based on the lower bound -0.52 and upper bound 0.01.

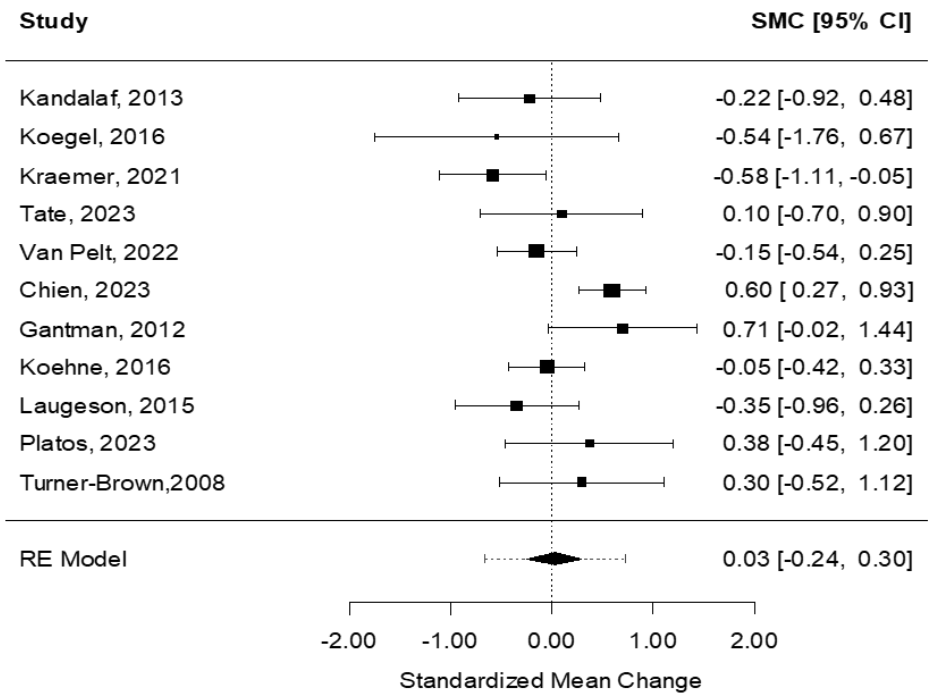
This identified that the change within groups of adults with ASD before and after the empathy interventions was not significant (g=-0.26, (95% CI -0.52, 0.01), p=0.06). There is a small effect, but non-significant. Only one study Tate et al. (2023) showed a significant effect.

Additional Analyses

A random effects meta-analysis was carried out on the pre- and post-studies and just the intervention group from the RCT studies (See Figure 4).

Figure 4

Forest plot intervention only

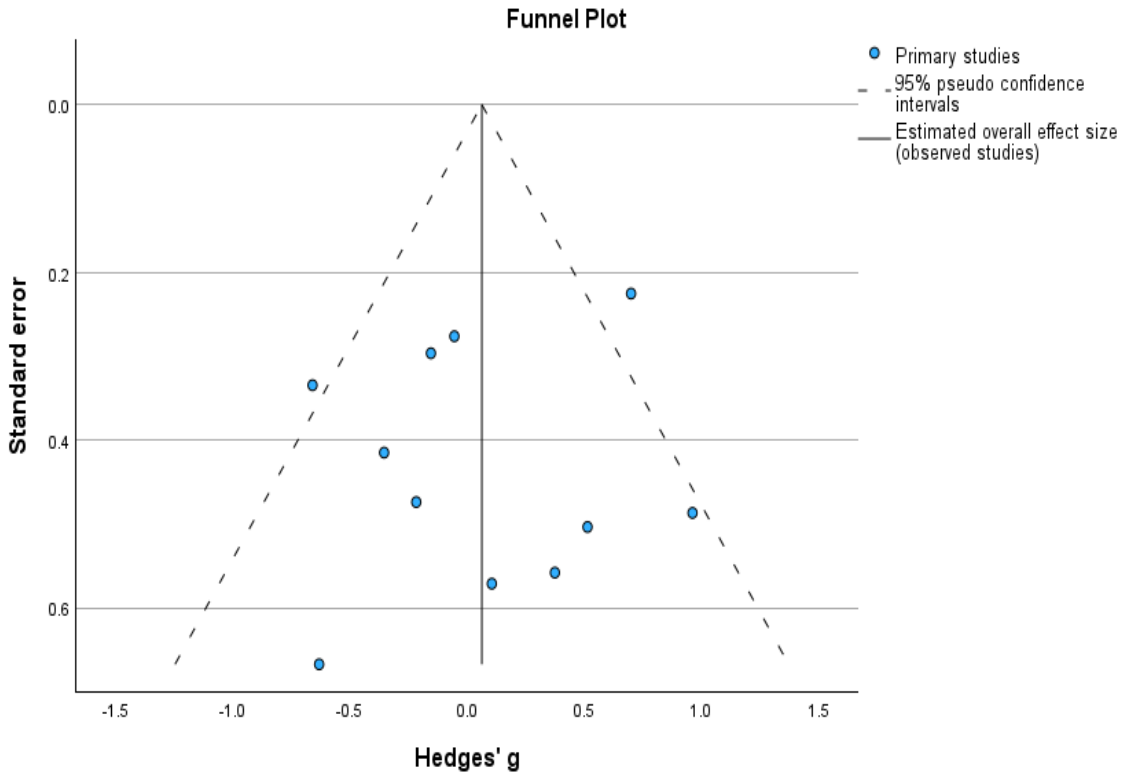


Findings were that the non-significant results remained and there was a small effect. (g=0.03, (95% CI 0.14 -0.24), p=0.81).

Finally, to assess for publication bias the test from Egger, (1997) was selected as this test analyses continuous data which is the type of data gathered in this review. The test was conducted using SPSS. This included testing for funnel plot asymmetry through regression to test the relationship between the observed effect sizes and the standard error of the effect sizes. If the relationship was found to be significant, that might indicate publication bias. (See Figure 5) where this difference is outlined.

Figure 5

Funnel plot to assess for publication bias



Non-significant results were found, and visual inspection of the forest and funnel plot suggests that the distribution of papers is asymmetrical. This means we can suggest there was

a low possibility of publication bias being the reason for changes in effect sizes between groups of adults with ASD receiving empathy interventions and control groups.

3. Discussion

This systematic review and meta-analysis aimed to answer the question of the effectiveness of non-pharmacological interventions (i.e. psychological and social) to increase empathy in adults who have a diagnosis of ASD. To the author's knowledge, this is the first meta-analysis undertaken attempting to answer this question.

The primary findings from the meta-analysis on the between-group RCT studies found a moderate effect size for interventions. However, the difference between the intervention and control groups was non-significant. While this does not necessarily prove that these interventions increase empathy significantly compared to a control group, it is an intriguing finding. Additionally, only one study (Turner-Brown et al., 2008) used what could be described as an active control as they received treatment as usual. Whereas in the remaining five controlled studies the participants who did not receive the empathy intervention remained on a waiting list. This potentially provides even more confidence in the moderate effect size as the chance that another intervention in an active control had an effect is smaller. As noted by Cuijpers, (2021) while effect sizes remain a statistical concept even a small effect size can still have considerable clinical meaning. So, when we find a moderate effect size of an increase in empathy in a neurodevelopmental disorder in which empathy difficulties have been linked with ASD (Shirayama et al., 2022) then this could mean that the interventions for empathy are moderately effective. However, due to there being a limited number of studies in the analysis, it is possible that the analysis was underpowered and a slightly more developed evidence base in this area may lead to a finding that the efficacy of interventions compared to a control could be clinically significant.

The findings from the meta-analysis on within-group studies using a pre-and post-design were that there was a small effect, yet this was close to significance. Moreover, only

one study in the pre-post studies showed a significant effect (Tate et al., 2023) but we cannot say that the effect is not due to practice effects or other extraneous variables. However, it is also important to raise that these were uncontrolled studies. Therefore, we cannot conclude that the change in empathy was not due to the intervention alone. While a within-group design does not control for extraneous variables the way a between-group design does. A moderate effect size is likely to be expected as studies included some participants who were in active control. The participants who received treatment as usual, might mean that they would be likely to make improvements as well due to that usual treatment. Nevertheless, it is important to view these studies in the context of adults who have lived with ASD and who have then made improvements in empathy following intervention. The pooled data for this meta-analysis and review suggests encouraging findings for interventions to increase empathy delivered to adults with ASD, but further research is warranted.

Additionally, when considering the non-significant results of Egger's test which suggested that there was a low risk of publication bias it is important to note that the studies had a relatively small sample size. This also included small N=1 case studies with as little as three participants in the sample. Therefore, as noted by Egger, (1997) the capacity to detect bias will be limited when meta-analyses are based on a limited number of small trials. Therefore, caution of this result is warranted.

Another important point to note is that numerous studies were excluded due to not being delivered to an adult population. This reflects that the existing literature is largely related to delivering these interventions to children and adolescents with ASD and this finding was one of the motivations for conducting a meta-analysis on adult-focused interventions. Yet, interventions for children with ASD could be argued to have more wrap-around care and support, whereas adult interventions might be more standalone. For example, children with a diagnosis of ASD may be likely to receive additional school support, or treatment through

children and adolescents' mental health services. This could raise attention to any additional needs such as ASD. It is unlikely adults with ASD would have access to such support due to service provision. Furthermore, themes in research with children with ASD included interventions through creative means such as play-based empathy training (Kazemi & Abolghasemi., 2019) and performance and theatre-based interventions (McDonald et al., 2022). Other novel treatments include research from Japan where humanoid robots were used for a social skills training intervention (Takata et al. 2023). Findings from the research with samples including children and adolescents have suggested improvements in both social communication and empathy, suggesting that empathy interventions are effective. However, it is clear from this review that this breadth and range of interventions are not offered to adults with ASD.

Research suggests that empathy begins to develop at an early age, but the brain regions used for these skills may not fully develop until late adolescence (Choudhury, Blakemore, & Charman, 2006). This suggests that the development of empathy is an ongoing developmental process and therefore the augmentation and adaptation of therapies for empathy with adults would likely need to be different to those that we know are effective with children and adolescents. This poses questions for researchers and clinicians about expected changes in empathy in adulthood, and whether, or how interventions should be augmented.

There were limitations in this meta-analysis. The first of these was the empathy measurement used. The EQ was one of the main outcome measures that data was gathered from in this paper. Yet due to the definition of empathy being difficult to operationalise in instruments like the EQ, this may also hamper results. Furthermore, the EQ is a self-report measure which can be used in both the general and ASD populations. Therefore, as the measure is self-report there is a likelihood of social desirability, perhaps more so in a neurodiverse population if they feel a desire to 'fit in'. Research suggests that adults with ASD may attempt

to camouflage and try to fit in by masking or hiding social difficulties as a response to stigma (Perry et al., 2022). This may align with research from Harrison et al. (2022) who suggested the use of empathy measures did not show good psychometric properties in measuring empathy within an autistic population. Therefore, when considering outcome measures used overall to evaluate empathy it could be a helpful covariate to look at the outcome measure type and the type to be split into objective versus self-report. However, a strength of this review is that the authors had agreed on a pre-defined hierarchy of empathy outcome measures to ensure high-quality measurement of empathy was included.

A further limitation of the review was the overall high risk of bias identified in studies. Whilst the studies might have had lower risks of bias this was not always possible to determine. For example, it was noted that none of the RCT studies had reported that the study was pre-registered or appeared on a pre-registration database. This meant the risk of basis assessment scores was increased. Additionally, in some studies, there were changes due to researchers attempting to recruit by working around the participant's schedules. Whilst this resulted in more participants in the studies, it did come at the cost of sacrifice to introduce potential bias as participants were changed to a different condition meaning they were not randomly assigned but rather assigned based on convenience. Given the smaller nature of the study sample size, this by nature was more problematic. Furthermore, some studies were forced to change the length of intervention due to COVID-19 restrictions and one study had to change to a virtual intervention rather than face-to-face. This intervention had a social focus and there has been mixed evidence about the naturalistic feel of online interventions, especially for ASD groups Lodder et al. (2020); Lunsky et al. (2022). These factors whilst often outside of the researcher's control did then result in an increased bias rating.

Finally, the implications include having a better understanding of ASD and empathy which can lead to a reduction in negative connotations of working with someone who is deemed

to lack the ability to empathise. It is also likely to have benefits for the person and their social connections and interpersonal relationships. This could mean that contact between clients and professionals finds increased engagement too as there is likely a subconscious feeling of likeability towards clients and research has suggested that if healthcare professionals 'like' the clients they work with then the client is likely to have increased positive outcomes. Elliott, et al. (2018) in a meta-analysis found that empathy is a moderately strong predictor of therapy outcome. This means that if a therapist has improved empathy, then the client is likely to have a better therapeutic outcome. Therefore, an increase in empathy would have a bi-directional impact.

Considering factors such as flaws in the utilised empathy scales there is not enough evidence at present to conclude that non-pharmacological empathy interventions are effective for adults with ASD. Furthermore, the quality of the studies included in the review is likely to have resulted in a reduction in effect size overall (Cuijpers et al. 2010). Still, this review suggests that further high-quality research in this area is warranted to be able to comprehensively review the efficacy of psychological and social interventions to increase empathy in adults with a diagnosis of ASD.

Recommendations include more research into empathy interventions with adults with ASD. In line with the research outlined in the introduction, Song et al., (2019) concluded that future research should clarify which subtype of empathy is included in studies. Research should specify which types of empathy they are attempting to increase, i.e. cognitive, emotional, or behavioural. Empathy outcome measures should be theoretically matched based on this to ensure validity and reliability. Once the subtype of empathy is decided a decision could be made as to which outcome measure to use and to reduce heterogeneity the same outcome measure should be used. As discussed by Cuijpers, (2021) perhaps numbers needed to treat instead of standardised mean difference (effect size) would appear more clinically relevant in

this population. Even if there is a small or moderate effect size found in future research the numbers needed to treat would indicate the number of adults with ASD that would need to be treated to have more positive outcomes (increase in empathy) than no treatment (or an alternative treatment) (Laupacis et al., 1988).

This review did not discriminate between people with lower or higher IQ and functioning as it relied on the specificity of the ASD diagnosis. However, it could be useful for future research to account for co-occurring diagnoses such as a learning disability, as this might provide further evidence on how interventions for empathy should be augmented in the presence of a learning disability. Yet, restricting the study sample to individuals free of comorbidities may limit the generalizability of its findings to clinical practice, where comorbidities are common.

In considering non-autism-related ToM impairment, research suggests that ToM impairment is a concept that exists across a broad array of diagnoses such as Schizophrenia (Bora et al., 2009). Additionally, using verbal and non-verbal ToM tasks and matched controls Muller et al. (2010) identified a ToM deficit in people who have experienced a traumatic brain injury.

According to Jacobs & Nader-Grosbois (2020) ToM is known to be deficit or delayed in children with intellectual disabilities (IDs), yet, after providing ToM training, the children in this study displayed a better understanding of cognitive mental states and of consequences of emotions. As well as impacting people with mild cognitive impairment Moreau et al., (2015) ToM impairment is also apparent in later-life neurodegenerative disorders, and clients with different neurodegenerative diseases may present different patterns of ToM deficits based on the progression of the neurodegenerative disease (Poletti et al., 2012).

A final implication of carrying out future research into the effectiveness of non-pharmacological interventions (i.e. psychological and social) to increase empathy in adults who have a diagnosis of ASD can be linked back to the epidemiological research link and the economic impact of the burden of ASD. Finally, considering most studies included in this review are very recent this could suggest that this is an emerging topic area and that this is a very timely review.

Highlights:

- Moderate effect sizes for empathy-based psychological and social interventions for adults with ASD.
- Empathy is largely researched as a broad concept rather than subtypes (e.g. cognitive, emotional).
- Additional considerations such as camouflaging should be considered in self-report empathy outcome measures.
- Further high-quality research in this area is warranted to be able to comprehensively review the efficacy of psychological and social interventions to increase empathy in adults with a diagnosis of ASD.

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The data that was used was publicly available, therefore there were no ethical considerations to be made when accessing this data. Furthermore, consent was not deemed necessary.

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Chapter 5. Extended Chapter for Empathy

Firstly, there were strict word counts in the guidance for the journals the papers were written for which meant decisions needed to be taken about what information was privileged and therefore essential to include in the papers. This was essentially data that addressed the research questions. This meant further detail about the concept of empathy was omitted in the journal. Therefore, this chapter aims to provide sufficient detail about the complexities of empathy.

Empathy is a difficult concept to define. Cuff et al. (2016) examined 43 discrete definitions of empathy and found that eight themes relating to the nature of empathy emerged. The themes were “distinguishing empathy from other concepts”; “cognitive or affective?”; “congruent or incongruent?”; “subject to other stimuli?”; “self/other distinction or merging?”; “trait or state influences?”; “has a behavioural outcome?”; and “automatic or controlled?”. There are a variety of ways that the concept of empathy can be described. This is problematic in research whereby being able to replicate studies in the hope of finding similar results should help researchers interpret findings as reliable. Furthermore, validity comes into question if the concept of empathy becomes so broad or has so many different descriptions that its true meaning changes. This could lead to researchers not being able to operationalise the concept and therefore inconsistencies in the measurement of it which in turn creates unreliability.

In terms of the development of empathy, research has predominantly focused on children and adolescents given it is seen as a developmental task. Silke et al. (2018) conducted a review of studies on adolescents and their levels of pro-social behaviours and empathy. The results indicated that many different contextual and psychological factors influence the levels of empathic and prosocial responding expressed by adolescents.

However, their research findings also noted that differences in responses depend on how empathy is operationalised.

Whilst empathy is a standalone theoretical concept, it does overlap with other theories. Of these Theory of Mind (ToM) (Premack & Woodruff 1978) has the most literature and research. ToM refers to the ability to understand that other individuals have mental states, such as knowledge, intentions, beliefs, desires and emotions.

Concerning autistic spectrum disorder (ASD), difficulties in social interaction, communication and repetitive behaviour have previously led researchers to suggest that people with ASD have deficits in ToM (Baron-Cohen et al., 1985). However, later research suggests the complexities around this link. Brewer et al. (2017) found that the variability in ToM within an ASD sample was substantial, suggesting that ToM deficits might not be universally present. Loza et al. (2023) also found that in a ToM task, the participants with ASD might have translated the social instructions into a general rule that proved more efficient in this situation. Therefore, the findings suggested a critical distinction between ToM understanding and the continuous use of a ToM strategy in repeated situations by people with ASD. Therefore, a strength in the way that people with ASD approached the task was apparent. Additional research has also found heterogeneity of ToM in an ASD population (Rosello et al., 2022). Baron-Cohen (2002) complemented the ToM hypothesis by proposing the extreme-male-brain theory of autism. According to this account, males tend to have a higher systemizing ability but lower empathizing ability than females. (Systemizing is the drive to examine and construct a range of rule-governed systems.) The extreme-male-brain theory continued the historical view that people with ASD lack emotional empathy.

To clarify some of the types of empathy Blair, (2005) argued that the term empathy incorporates a variety of neurocognitive processes. Three main divisions, each reliant on at

least partially dissociable neural systems are identified as cognitive, motor, and emotional empathy. Later, research from Baron-Cohen, (2011) proposes that empathy can be classified into cognitive, emotional, and behavioural empathy.

Moreover, the concept of mentalising developed by Fonagy and Bateman (2006) is also linked with empathy as advanced mentalizing skills may be related to the capacity to empathize with others (Hooker et al., 2008). In a neurobiological-focused study, Arioli et al. (2021) found that altered mentalizing-related activity involved distinct sectors of the posterior lateral temporal cortex in schizophrenia and autism, while only the latter group displayed abnormal empathy-activation in the amygdala. These data might inform the design of rehabilitative treatments for social cognitive deficits. This again brings us back to differences in social interaction and communication in ASD being linked with deficits in empathy.

Yet, a higher-than-average ability to empathise emotionally has been proposed. This idea called the 'Empathy Imbalance Hypothesis (EIH)' (Smith, 2009), may provide further insights into empathy in people with ASD. The EIH builds on the ToM account and provides an alternative to the extreme-male-brain theory of autism. The EIH proposes that people with ASD show impaired cognitive empathy while maintaining high emotional empathy functioning and that this imbalance contributes to some autism symptoms such as the social difficulties displayed in ASD (Shalev & Uzefovsky, 2020). Further research has also suggested that people with ASD do have empathy deficits but not in emotional empathy. Findings were that people with ASD appear to have cognitive empathy deficits, but average levels of affective (aka emotional) empathy (Baron-Cohen & Wheelwright, 2004). Additionally, it is argued that individuals with autism show difficulties with cognitive and motor empathy but less clear difficulties concerning emotional empathy (Blair, 2005).

When focusing on empathy in people with narcissistic personality disorder (NPD) the research has found links with narcissism. Simard et al. (2023) found a relationship between narcissism and empathy and suggested their results support the existence of differential empathy functioning patterns based on the components of narcissism. They note inconsistent results in the previous literature between empathy and narcissism may stem from discrepancies in the definition of empathy, the narcissism facets being assessed, and methodological variations among studies.

There is less research on NPD and a plethora of research related to psychopathy deficits in empathy are linked to psychopathy (Ali, Amorim, & Chamorro-Premuzic, 2009; Blair, 2008). Individuals with psychopathy show clear difficulties with a specific form of emotional empathy but no indications of impairment with cognitive and motor empathy (Blair, 2005). Yet, the research on NPD appears to be more recent, Ritter et al. (2011) suggest a lack of emotional but not cognitive empathy. Baskin-Sommers et al. (2014) suggest a need to recognise the multifaceted relationship between empathy and narcissism and they recommend moving away from the belief that people with NPD simply lack empathy so that professionals working with this population such as therapists may better understand narcissistic patients' behaviour and motivational structure.

More broadly the clinical implications of research on empathy are extremely important. Empathy has been commonly believed to be associated with the risk of violence. Chialant et al. (2016) suggest that the specific areas of the prefrontal cortex and limbic system, which have been associated with violent behaviour, also appear to subserve the capacity for empathy. Damage to these regions may result in the emergence of aggression, but not empathy. This suggests a structurally inverse relationship between the two. Furthermore, the idea that if a person shows remorse or empathy for their act of violence then they would be less likely to re-offend was postulated by Dandawate et al. (2019) who

concluded that there is little empirical evidence of any kind to support the weight placed on the expression of remorse for any index offence. In line with this research on sex offenders have developed an opposing approach from the view that increased empathy is the goal. Mann and Barnett (2013) suggest that victim empathy work is unnecessary and even harmful in this population. Their rationale for this statement is that identification of poor empathy for past victims does not necessarily explain previous or future offending as there are many reasons why an offender minimizes the harm that his victim experienced, for instance, to reduce his subjective feelings of shame and guilt. This is an intriguing area of research and studies such as these inform interventions that are provided.

The concept of empathy continues to be a complex phenomenon. Research has made links with ASD and deficits, yet these are thought to be in cognitive empathy, rather than emotional empathy. Narcissism NPD is thought to involve a deficit in emotional empathy but with an ability to express cognitive empathy. It is important to understand the nuances in types of empathy to inform interventions appropriately. To sum up the recent developments in empathy, the research has highlighted that empathy as a construct is difficult to define. There are numerous definitions, but no universally agreed gold standard. The consequence of this is that empirical research into empathy is difficult to synthesise and draw overarching conclusions from. As a construct empathy is relevant to both NPD and ASD. However, how empathy is viewed in both presentations varies with much more of a research focus for ASD being neurobiologically driven and NPD being best construed through a psychodynamic lens or in the field of forensic psychology. This further complicates the field of empathy as studies in NPD and ASD are likely to align to their definitions of NPD and ASD very differently because of both the lens they are examined through, but also due to the plethora of definitions of empathy that exist. Whilst this is recognised, the landscape in empathy continues to be challenging. This is because more contemporary research in empathy is moving towards a

dimensional approach such as measuring empathy through different subtypes. Consequently, one way that future research could lean into this issue would be to specify the type of empathy that is the focus.

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Chapter 6. Extended Chapter for Covariates and Comorbidities

Again, the strict word count in the journal papers meant that some contextual information around the co-variates was not described in sufficient depth in the papers. Therefore, this chapter aims to provide more detail about these co-variates.

Gender

Originally in the systematic review on the prevalence and comorbidity of narcissistic personality disorder (NPD) and autistic spectrum disorder (ASD), gender was planned to be a potential covariate in the meta-analysis. However, meta-analysis was not possible due to clinical heterogeneity meaning it was not going to be possible to use gender as a covariate. Despite this, the study did produce some findings related to gender, namely that males were more prevalent in the studies across both conditions.

It was important to include gender as one of the research questions as Lugnegård et al. (2012) found in their study that while nearly half of the participants fulfilled the criteria for a personality disorder, there was a significant difference across sex: men with Asperger's syndrome met personality disorder criteria much more often than women with Asperger's syndrome (65% vs 32%). It is important to note the research on females and ASD, Lai et al. (2015) suggested that the number of females with ASD is under-diagnosed, as they are often missed or misdiagnosed. In a review, Tubío-Fungueiriño et al. (2021) support that camouflaging seems to be an adaptive mechanism for females with ASD.

Age

Further consideration of the age cut-off also took place. Both the systematic review and the meta-analysis paper included studies that were published after 1980. The reason for this was that NPD was first diagnosed in the Diagnostic and Statistical Manual of Mental Health 3rd edition (DSM-III). This was published in 1980. At the same time Wing and Gould,

(1979) classified the triad of symptoms associated with autism and coined the term autistic spectrum disorder (ASD). Therefore, studies published before this time would not be able to adhere to the internationally recognised classification systems.

The inclusion criteria also specified that participants in studies needed to be 18 years or older. This meant exclusion criteria included any studies undertaken with children or adolescents. This meant that in the empirical paper any studies that included both child, adolescent as well as adult participants needed to be excluded as it was not possible to extract the adult-only data.

One of the reasons that this age range was selected for inclusion was that research suggests that the brain does not fully develop until age 25 (Arain et al. 2015). The consensus is that this is because the prefrontal cortex in the frontal lobe of the brain has not fully matured. This is an important point to make as it does not fit with the persistence of a personality disorder being a long-standing condition that is prevalent from a young age and that personality is still developing. Perhaps future research could use different age brackets in their analysis as a covariate to see whether the effect size changes.

The justification for the age range included in these papers was also that the authors were aware of ethical concerns and debates around the diagnosis of a personality disorder at a younger age and the potential outcomes that the person could therefore experience. Mars et al. (2021) researched whether personality difficulties are associated with treatment outcomes in primary care services. Their sample included 3,689 adults who accessed community-based psychological treatment (cognitive behavioural therapy, emotional skills training, or other psychological therapy) for depression and/or anxiety disorder. They concluded that patients with personality difficulties have a less favourable response to psychological treatment for depression/anxiety disorder.

Although not recommended personality disorder is and can be diagnosed in adolescence and 18 so, a risk of missing out on useful papers with this exclusion was considered. However, there is considerable concern among clinicians about giving this diagnosis (Papadopolous et al., 2022). Therefore, given the concerns around the diagnosis and reticence to use it, there were concerns that any samples that existed would not have external validity. Research suggests that a diagnosis of a personality disorder must be problematic, persistent, and pervasive (Tyrer et al., 2015; Sperry, 2014). Therefore, by including adults only there would be a small proportion of children or young people that were missed with this inclusion and exclusion criteria. This review did not exclude the older people population based on an upper age limit.

Learning Disability

One of the difficulties considered was whether to include or exclude the presence of a learning disability (LD). During the Public Patient Involvement (PPI) focus groups advice was provided by the autism team to include people with a learning disability too as they found when researching 'pure' ASD and excluding people with an LD in their research, they lost too much data. This is understandable as there is a vast amount of literature and an identified comorbidity between LD and ASD. Khachadourian et al. (2023) in a study sample consisting of 42,569 individuals with ASD and their 11,389 non-ASD siblings (full and half-siblings) found that 74% of the sample had at least one comorbidity. Furthermore, after attention deficit hyperactivity disorder, learning disability (23.5%) and intellectual disability (21.7%) were the next most common comorbid conditions in ASD.

Additionally, there is an emerging literature on personality disorders and LD broadly. Flynn et al. (2002) found that personality disorder is a common diagnosis in adults with a LD. Yet, some research that includes a personality disorder has specifically excluded the presence of an LD such as Strunz et al. (2013).

A potential justification for excluding the presence of an LD would be for reasons of heterogeneity and to ensure that the focus of the research is on ASD. Additionally, considering the already apparent variance in the ways that NPD and ASD are diagnosed there is a risk of further diluting these diagnoses with additional psychometric tools that aim to diagnose an LD. However, questions would then have involved asking at what range of LD would participants be included; Mild, Moderate, Severe or Profound. For example, would participants be included who fall in the 'borderline' LD range? There is some argument for this as Wieland and Zitman, (2016) noted that the DSM-5 no longer provides any criteria for what exactly borderline intellectual functioning is despite it being a frequently unrecognised comorbid condition. Furthermore, a question may be whether participants need to meet the LD range of below 70 using the WAIS assessment developed by Wechsler, (2008). If that were the case then further questions would then need to be asked about what additional information was supplied alongside the WAIS assessment, such as functioning information because a diagnosis of an LD is best supplemented with information about adaptive functioning. Kenyon et al. (2014) note that the LD definition in the UK is described as a significant global impairment of intellectual functioning and adaptive functioning present before the age of 18.

Likewise, it was considered that specifying the range for inclusion may resurface some of the unhelpful portrayals of 'high functioning' ASD, whereby ASD is sensationalised in the media (Berryessa, 2014) and the importance of neurotypical perceptions of ASD was noted (Ressa, 2021). Consequently, after careful consideration, the authors decided to include the presence of an LD as there is a clear overlap between ASD and LD and we did not want to exclude vast amounts of literature in an area where more research is already required. However, future research could further explore the differences in ranges of learning disabilities for any possible differences in effect sizes.

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Chapter 7. Discussion and Critical Evaluation

This chapter presents a discussion of the findings from both the systematic review and meta-analysis together and provides an evaluation of the overall thesis process. Both papers explored autistic spectrum disorder (ASD) in adults and empathy deficits, the review paper also explored narcissistic personality disorder (NPD). Yet, the difference between the papers was that the empirical paper analysed and aggregated quantitative data to be able to provide an overall effect size of non-pharmacological interventions to increase empathy in adults with ASD. Yet, each paper made a unique contribution to the research literature.

Overview

An overview of the results was that people with diagnoses of NPD and ASD both have empathy difficulties, yet there are different types of empathy, that should be treated as separate. The systematic review and narrative analysis found that it was not possible to conduct a meta-analysis as research studies have a low bar for diagnosis of NPD and ASD which led to clinical heterogeneity between studies. The results from the meta-analysis were that non-pharmacological empathy interventions were moderately effective. Additional findings were that empathy is a complex concept to describe and understand, but that social interaction and communication differences in ASD may have led to the belief that people with ASD lack empathy. Also, women are less likely to be diagnosed with ASD than men which relates to previous research and literature in the field.

Strengths and Limitations

The main limitation was the inability to gather data on the prevalence of NPD and ASD. A critical issue in being able to meta-analyse prevalence was due to the types of study designs that are carried out in research. Caution is warranted when considering the empathy measurement tools used in studies due to the definition of empathy being difficult in instruments like the Empathy Quotient (EQ) (Baron-Cohen & Wheelwright, 2004) which

may hamper results. Furthermore, as the EQ is a self-report measure this has limitations in terms of social desirability. A further limitation of the review was the overall high risk of bias identified in studies; all five non-randomized studies included were rated as having a serious risk of bias. It was noted that there was a lack of controlled studies that have been published in this area. Nevertheless, a key strength of this work is that it was able to find a moderate effect of non-pharmacological interventions to increase empathy in adults with ASD. Additionally, only one of the controlled studies used an active control, while in the remaining five controlled studies participants who did not receive the empathy intervention remained on a waiting list. This potentially provides even more confidence in the moderate effect size as the likelihood of another treatment being the reason for the effect is reduced. The moderate effectiveness of the non-pharmacological interventions for adults with ASD is a finding that will be a pivotal starting point for more research in this area, as so far research has focused on empathy interventions in children and adolescents.

Reflections on the process of completing the thesis portfolio

My initial interest in this thesis topic stemmed from my work and personal experiences before and during clinical training. I had previous experience working with people with personality disorders mostly in forensic settings and personally knowing people with ASD. Before training as a Clinical Psychologist, when I worked as a Research Assistant on a large-scale randomised control trial (RCT) for men with anti-social personality disorder the project involved carrying out the SCID-II assessments (First et al.,1995) as part of recruitment. I recalled that there were not many people who appeared to score for narcissistic personality disorder, and I began considering the psychometric tool used and how much information it could truly capture. My experiences were that people with personality disorders were demonised and treated as dangerous and when people with ASD attempt to communicate it could be labelled with terms that contained unhelpful connotations such as

‘challenging behaviour’. This made me think that both these cohorts could be misunderstood and demonised. When carrying out literature reviews and exploring the diagnoses further, I was shocked to learn that it was only in 1980 that autism was made distinct from Schizophrenia in the DSM-III (APA,1980). At the same time, I also noticed on placements that clinically a lot of the people I have worked with who have schizophrenia or psychosis diagnoses also seemed to display traits of ASD which made me reflect on the comorbidity of these diagnoses.

Before beginning this research, I had no experience in carrying out a systematic review or a meta-analysis, so I selected this type of research as I wanted to learn more about different areas of research and develop my research skills. The initial plan was to conduct a meta-analysis on the prevalence of NPD and ASD. This would have therefore been my empirical paper. However, the quality of the studies returned meant that meta-analysis was not possible. Other statistical approaches were considered which included fuzzy-set qualitative comparative analysis (Ragin, 2000) which is a quantitative and qualitative approach used when meta-analysis is not possible. I learnt that fuzzy-set analysis was a fairly niche approach to analysis with only a handful of people in the country being versed in this. To explore this further, I consulted with the research consultant from the London School of Economics and Political Science to see if this was a possible approach with the data extracted. However, this was not. This was initially disappointing as it meant my original thesis plan to conduct a meta-analysis on the prevalence of both ASD and NPD was not possible. It was also a concerning time as I did not have a viable empirical project. Following discussion with supervisors and reflection we identified a plan to convert the planned meta-analysis to a systematic review and then complete a different meta-analysis which would form the empirical paper. Whilst this was a difficult and worrying time in the thesis process, I believe, on reflection that I learnt many skills, but also how research in the real world is not

always perfect. Reflecting I feel pleased with the approach taken and I feel that the research question identified for the empirical paper is a useful and meaningful question to have asked. Whilst it would have been easier just to do a meta-analysis on the poor-quality data, I am aware that there would have been very little meaning attached to the results, and whilst this was difficult, I feel pleased that I was able to uphold scientific rigour and do the right thing, even though it was the more difficult thing to do. Yet, I also felt that by the time I was working on my second systematic review, I noticed how much I had learnt already in terms of conducting a systematic review.

In the data extraction for the empirical paper, there were initially 12 studies that met the inclusion criteria after full-text screening. Unfortunately, I was not able to gather the full data for the final study as the authors had omitted the raw data from the research paper. A formal email requesting this data was made, and I even used an email template from systematic review guidance (Boland et al., 2017) to ensure that my request was worded appropriately. I had naively hoped for a quick response, but I did not receive one which meant that unfortunately the paper could not be included in the analysis.

My reflections on conducting a systematic review and meta-analysis were that it does not take a large amount of time to carry out the actual analysis but preparing the data that is used for the analysis and ensuring the research question is focused enough to ensure you have good data for the analysis does take considerable time. During the data analysis stage, it also took time to learn how to use the R software package and to learn to run the coding in the program.

Additionally, I found the task of writing up a research thesis in an academic journal ready for publication quite daunting. I found resources to help me in this quest, in particular, the Elsevier Research Academy website has published free e-learning which included an e-

learning on ‘10 tips for writing a truly terrible journal article’ (Elsevier Research Academy, 2023) which I found to be a helpful approach of learning what not to do. The website also provided e-learning on related topics such as abstracts, that helped me to learn the importance of succinct and clear abstracts. I will continue to access these e-learning packages in my future career as a researcher.

Theoretical Implications

My knowledge of the theories about empathy and what that encapsulates has already grown through carrying out this research. I have noted there is a body of research on the neuropsychology of empathy that suggests empathy incorporates a variety of neurocognitive processes. The concept of empathy continues to be a complex phenomenon as many different contextual and psychological factors influence the levels of empathy. I also noted that research has suggested that people with ASD have deficits in cognitive empathy, rather than emotional empathy. Whereas people with NPD are thought to struggle with emotional empathy. Yet, the differences in empathy are nuanced and it is important to understand this to inform appropriate interventions.

Clinical Implications

During the time this research was carried out I was working on my placement in a diagnostic ASD team where I was able to complete the full training in the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) (Lord et al. 2012) that covered coding, administration, and clinical application. I considered myself to be very lucky as I am aware it was costly training, yet I was able to express my interest in working with this population in future. Whilst working in this team I reflected on the assumption that clients and the public would have on whether a person has ASD. As well as the professional’s initial impression of whether a person would meet the criteria for ASD before carrying out the full ASD diagnostic assessments. What I found was that there were many occasions where at face value a person

appeared to meet the criteria for ASD as they may have displayed common characteristics such as lack of eye contact. However, when the ADOS-2 assessment was completed a larger number of clients than I thought did not meet the criteria for diagnosis of ASD. Then follow-up work would take place such as comparing the results of the ADOS-2 with the developmental history, gathering collateral information, and considering concepts such as camouflaging and masking where other psychometrics were used such as the Camouflaging Autistic Traits questionnaire (CAT-Q) developed by Hull et al. (2019). Finally, this would result in a wider team discussion with many professionals with a lot of experience in diagnosing and working with people with ASD. I reflect that making a diagnosis is not as straightforward as first thought and often made more complicated by various contextual factors. Furthermore, I also noticed the time that is taken in an NHS setting to explore the information provided by clients when they have sought out private autism assessments with the hope that this would increase access to support. I considered the ethical function of this too and consider that when I work in the NHS post-training, I will be mindful of this.

Additionally, as part of developing the question Patient and Public Involvement (PPI) meetings took place with professionals in Personality Disorder and ASD services which included peer support workers with lived experience. PD service had not worked with NPD in many years of service, which fits in with the idea of NPD not accessing NHS services unless in trouble. Yet, the PD service seemed to be aware of the toxicity of the diagnosis as I received what felt like a visceral reaction when it was explained that I was carrying out research in this area. Overall, professionals appeared to be more confident in working with people with ASD, and less confident NPD.

I spent some time considering the language and terms used in this population. In December 2023 a new training in NHS was released called ‘The Oliver McGowan Mandatory training on learning disability and autism’ which is the government's preferred

and recommended training for health and social care staff. This training unfortunately stemmed from the death of a young person with ASD. There is much debate on the correct and preferred terminology to use to describe this set of symptoms including 'autistic', 'on the autism spectrum' and 'someone with autism' NHS England (2023). Yet, I also follow a lot of people on Twitter (now known as X) who have an ASD diagnosis and there was a lot of conversation about this and disagreement. Additionally, to be consistent and clear in the research it was fitting to use the term autistic spectrum disorder to suit the diagnostic term that was being discussed. I think I will continue to ask the person what their preferred term is and when discussing with colleagues then follow the guidance of this updated training.

Future research directions

Future research should clarify which subtype of empathy is included in studies and would benefit from defining empathy within subtypes rather than globally whilst camouflaging should be considered in self-report empathy outcome measures, as well as considering possible gender differences. Another way this research could be improved is to carry out additional analyses on differences with self-report or other types of empathy measurement. Also, it would be interesting to see further research and analyses on inpatient/ locked settings versus low-secure/ community settings as both NPD and ASD are likely to differ in the way that they access services. Finally, when the literature in this area has achieved consistency and clarity in diagnoses and analysis of prevalence is possible, it would be interesting to see an additional covariate analysis of the difference between low- and high-income countries.

Both papers have been formatted following author guidelines for ease in the process of publication. The systematic review and narrative synthesis of the prevalence and overlap of NPD and ASD understanding of empathy challenges will be submitted for publication in

the Journal of Psychiatric and Mental Health Nursing. The systematic review and meta-analysis on the effectiveness of non-pharmacological interventions to increase empathy in adults with ASD will be submitted for publication in the Journal of Psychiatric Research.

When deciding on the most suitable journals to prepare papers for the impact factor of each was considered. The Journal of Psychiatric and Mental Health Nursing has a 2.7 impact factor while the Journal of Psychiatric Research has a 4.96 impact factor.

Overall Conclusion

This research was about the overlap of NPD and ASD where it was concluded that studies using NPD and ASD populations often have a low bar for diagnostic inclusion such as poorly validated self-report measures. The meta-analysis researched non-pharmacological empathy interventions for adults with ASD and found a moderate effect size. It was recommended that future research should ensure that participants have a diagnosis using gold-standard psychometric tools. The clinical implications of this research are also about recommendations for clinicians of co-occurring symptomatology to conduct in-depth developmental histories and utilise shared decision-making to improve the care provided.

A reflection on my reflections is that many points have been discussed concerning clinical implications. While I am hopeful that through publication in journal articles, this research will be impactful, I am mindful that further research needs to be carried out in this area before many clinical implications and recommendations can be made with greater certainty. I am also aware that research takes some time, so I am hopeful that this work will make an impact clinically, even if it takes a while. This thesis portfolio therefore contributes to the NHS value of improving lives by committing to improving care.

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Appendices

Appendix A. Journal of Psychiatric and Mental Health Nursing Author Guidelines

1. SUBMISSION

New submissions should be made via the Research Exchange submission portal https://wiley.atyponrex.com/journal/jpm. You may check the status of your submission at any time by logging on to submission.wiley.com and clicking the "My Submissions" button. For technical help with the submission system, please review our FAQs or contact submissionhelp@wiley.com.

For help with submissions, please contact: JPMHNedoffice@wiley.com

We look forward to your submission.

Data Protection

By submitting a manuscript to or reviewing for this publication, your name, email address, and affiliation, and other contact details the publication might require, will be used for the regular operations of the publication, including, when necessary, sharing with the publisher (Wiley) and partners for production and publication. The publication and the publisher recognize the importance of protecting the personal information collected from users in the operation of these services, and have practices in place to ensure that steps are taken to maintain the security, integrity, and privacy of the personal data collected and processed. You can learn more here ...

Preprint Policy

The Journal of Psychiatric and Mental Health Nursing will consider for review articles previously available as preprints. Authors may also post the **submitted version** of a manuscript to a preprint server at any time. Authors are requested to update any pre-publication versions with a link to the final published article.

Data Sharing and Data Availability
This journal expects data sharing. Review Wiley's Data Sharing policy where you will be able to see and select the data availability statement that is right for your submission.

Data Citation
Please review Wiley's Data Citation policy.

2. AIMS AND SCOPE

The Journal of Psychiatric and Mental Health Nursing is an international journal which publishes research and scholarly papers that advance the development of policy, practice, research and education in all aspects of mental health nursing. We publish rigorously conducted research, literature reviews, essays and debates, and consumer practitioner narratives; all of which add new knowledge and advance practice globally.

All papers must have clear implications for mental health nursing either solely or part of multidisciplinary practice. Articles which draw on single or multiple research and academic disciplines are welcomed. We give space to practitioner and consumer perspectives and ensure research published in the journal can be understood by a wide audience. We encourage critical debate and exchange of ideas and therefore welcome letters to the editor and essays and debates in mental health.

3. MANUSCRIPT CATEGORIES AND REQUIREMENTS

i. Original Research
Word limit: 5,000 words maximum, excluding abstract and references.
Abstract: 200 words maximum; must be structured under the sub-headings: Introduction; Aim/Question; Method; Results; Discussion; Implications for Practice.

Accessible Summary: 250 words maximum; the purpose is to make research findings more accessible to non-academics, including users of mental health services, carers and voluntary organisations. The Accessible Summary should be written in straightforward language, structured under the following sub-headings, with 1-2 bullet points under each: What is known on the subject; What the paper adds to existing knowledge and What are the implications for practice.

Description: The journal welcomes methodologically, ethically and theoretically rigorous original research (primary or secondary) which adds new knowledge to the field and advances the development of policy and practice in psychiatric and mental health nursing.

Relevance Statement: Only papers relevant to mental health nursing practice will be considered for publication in the Journal of Psychiatric and Mental Health Nursing. We require that corresponding authors submit a statement that-in 100 maximum, sets out the

relevance of the work to mental health nursing practice. If authors do not convince the Editor in Chief of this, the work will not be considered for publication.
Reporting Checklist: Required - see Section 5.

ii. Review Articles
Word limit: 7,000 words maximum, excluding abstract and references.
Abstract 200 words maximum; must be structured under the sub-headings: Introduction; Aim/Question; Method; Results; Discussion; Implications for Practice.
Accessible Summary: 250 words maximum; the purpose is to make research findings more accessible to non-academics, including users of mental health services, carers and voluntary organisations. The Accessible Summary should be written in straightforward language, structured under the following sub-headings, with 1-2 bullet points under each: What is known on the subject; What the paper adds to existing knowledge; What are the implications for practice.
Structure: See below specific details for the type of review article. *Research Reporting Checklist:* Required - see Section 5.

The Journal accepts four types of scholarly reviews:

- Meta-analyses
- Systematic review
- Qualitative evidence syntheses
- Integrative reviews

The Journal would consider accepting other reviews such as rapid reviews, realist reviews and scoping reviews if they are accompanied by a strong scholarly rationale e.g., a rapid review might be conducted to up-date the literature from a previous systematic review. A realist review that focuses on what works for whom and in what circumstances would be considered if it is clearly related to the application of the intervention in mental health nursing practice.

Critical, narrative and rapid reviews are not usually considered sufficiently comprehensive for publication in this Journal unless there is a very good scientific rationale as to why a more systematic or comprehensive review was not undertaken. These could be restructured into a scholarly argument and submitted as an essay and debate paper.

Meta-analyses and **Systematic reviews**
Authors should follow the recommended PRISMA guidelines for Meta-analyses and Systematic Reviews. See Section 5 Research Reporting Guidelines.

Qualitative evidence syntheses
Introduction – to include a scientific rationale for the review based on what is already known and a statement of the review objectives.
Methods – to include protocol and registration (if applicable), review question, design, eligibility criteria, information sources, search strategy, assessment of relevance for inclusion,

quality appraisal, data extraction and synthesis (including process for assessment of the confidence in each finding if applicable).
Findings – study selection, study characteristics, findings of individual studies, synthesis of findings.
Discussion – Summary of evidence, what the review adds to the existing literature, limitations and strengths of the review, implications for further research, implications for mental health nursing practice that re linked to the new insights from the review.
Conclusion – an interpretation of the impact of the findings for consumers of mental health services, their families and mental health nursing practice.

Integrative Reviews
Please use the following headings based on the method described by Whittemore & Knafl (2005):
Introduction/ Background - to include a scientific rationale for the study based on what is already known and a statement of the review objectives.
Method – problem identification, search strategy including eligibility criteria, data evaluation (process of quality appraisal), data analysis (including process of data reduction, data display, data comparison and process for data synthesis.
Findings – Study selection, study characteristics, findings from individual studies, synthesis of findings
Discussion – summary of evidence (including strength of evidence), what the review adds to existing knowledge on the topic, limitations and strengths of the review, implications for further research, implications for mental health nursing practice.
Conclusion – an interpretation of the impact of the findings for consumers of mental health services, their families and mental health nursing practice that are linked to the new insights from the review.

iii. Lived Experience Narratives

The journal welcomes narratives from people with lived experience of mental health problems or services. These should have the potential to develop mental health nursing practice and/or advance wider personal understanding of mental health and problems. Narratives can be authored by a single person concerning their own experience, or jointly, for example, one person relating their own experience and another person providing context and analysis. In either case, the narrative should contextualise experiences by using some references to relevant literature (in the arts and/or the sciences). Please write your paper with the following questions in mind: Introduction: What would be a key take away message from your story? What experiences: what are your experiences and how do these relate to the key take away messages. Conclusion: What would you most like to see different in mental health care? What aspects of what you have described would you like to see replicated or developed in mental health nursing?

Joint authors of narratives of lived experience should ensure that there is a genuine and equal collaboration, and that the contextualisation or analysis avoids any interpretation of someone else's experience that has not been validated with that person.

This section will not consider 'case studies' written by professionals about people with lived experience nor will we accept letters of complaint about a specific service. ***** Please ensure anonymity is maintained if discussing a service, staff or other people. Authorship can be written under people's own name or using a pseudonym.****

Word limit: 5000 words maximum but can be a short as you like.

References: 10 maximum

Contacting an editor with your idea: If you have an idea or would like to speak to our handling editor about writing a narrative then please contact: Dr Charley Baker

iv. Essays and Debates in Mental Health

The purpose of these articles is to explore a contemporary topic relevant to mental health nursing practice/service user care, and to provide a rigorously developed theoretical perspective on a topic relevant to the Journal aims.

Word limit: 5,000 words maximum.
Introductory Paragraph: Authors must set out the purpose of the article
Abstract and Accessible Summary: N/A
Article Style: Arguments/scholarly exploration should be well-structured and delivered in a coherent and systematic style; must be clearly related to the aims of the Journal; a broad understanding of relevant literature must be demonstrated; well-developed integration of ideas and concepts. The topic should be of international relevance and be written in clearly expressed English.
References: 10 maximum
Reporting Checklist: N/A.

vi. Editorials

We publish Editorials of up to 1,500 words on issues that are topical and of direct relevance to mental health nursing. Please contact our Editor Professor Marie Crowe if you would like discuss your ideas: marie.crowe@otago.ac.nz

vii. Letters

Letters to the editor are welcome on any topic that is relevant to mental health nursing and the published content of the Journal. Please keep your points simple and focused. Letters responding to an article published in the JPMHN will normally only be considered if these are submitted within six months of the online publication date of the article. The author(s) of the published article will be given the opportunity to respond. Please try to limit your letter to 500 words.

4. PREPARING YOUR SUBMISSION

Cover Letters

Cover letters are not mandatory; however, they may be supplied at the author's discretion.

Parts of the Manuscript

The manuscript should be submitted in separate files: title page; main text file; figures; COI form.

Title Page:

The title page should contain:

i. A short informative title that contains the major key words. The title should not contain abbreviations (see Wiley's best practice SEO tips).
ii. A short running title of less than 40 characters
iii. The full names of the authors
iv. The authors' institutional affiliations at which the work was carried out
v. Corresponding author's contact email address and telephone number
vi. Acknowledgements.
vii. Ethical statements.

The present address of any author, if different from that where the work was carried out, should be supplied in a footnote.

Authorship

For details on eligibility for author listing, please refer to the journal's Authorship policy outlined in the Editorial Policies and Ethical Considerations section.

Acknowledgments

Contributions from individuals who do not meet the criteria for authorship should be listed, with permission from the contributor, in an Acknowledgments section. Financial and material support should also be mentioned. Thanks to anonymous reviewers are not appropriate.

Main Text File

Manuscripts can be uploaded either as a single document (containing the main text, tables and figures), or with figures and tables provided as separate files. Should your manuscript reach revision stage, figures and tables must be provided as separate files. The main manuscript file can be submitted in Microsoft Word (.doc or .docx) format.

The main text file should be presented in the following order:

i. Title, abstract and key words;
ii. Main text;
iii. References;
iv. Tables (each table complete with title and footnotes);
v. Figure legends;
vi. Appendices (if relevant).

Figures and supporting information should be supplied as separate files.

Style Points

- As papers are double-blind peer reviewed, the main text file should not include any information that might identify the authors.
- The journal uses British/US spelling; however, authors may submit using either option, as spelling of accepted papers is converted during the production process.
- Footnotes to the text are not allowed and any such material should be incorporated into the text as parenthetical matter.

Abstract

Abstracts and keywords are required for some manuscript types. For details on manuscript types that require abstracts and/or keywords, as well as how to prepare them, please refer to the ‘Manuscript Types and Criteria’ section.

Keywords

Please provide up to seven keywords When selecting keywords, Authors should consider how readers will search for their articles. Keywords should be taken from those recommended by the US National Library of Medicine's Medical Subject Headings (MeSH) browser list at https://www-nlm-nih-gov.uea.idm.oclc.org/mesh/.

References

For details on references please refer to the ‘Manuscript Types and Criteria’ section.

References should be prepared according to the *Publication Manual of the American Psychological Association* (6th edition). This means in text citations should follow the author-date method whereby the author's last name and the year of publication for the source should appear in the text, for example, (Jones, 1998). The complete reference list should appear alphabetically by name at the end of the paper.

A sample of the most common entries in reference lists appears below. Please note that a DOI should be provided for all references where available. For more information about APA referencing style, please refer to the APA FAQ. Please note that for journal articles, issue numbers are not included unless each issue in the volume begins with page one.

Journal article
Beers, S. R., & De Bellis, M. D. (2002). Neuropsychological function in children with maltreatment-related posttraumatic stress disorder. *The American Journal of Psychiatry,* 159, 483–486. doi:10.1176/appi.ajp.159.3.483

Book
Bradley-Johnson, S. (1994). *Psychoeducational assessment of students who are visually impaired or blind: Infancy through high school* (2nd ed.). Austin, TX: Pro-ed.

Internet Document
Norton, R. (2006, November 4). How to train a cat to operate a light switch [Video file]. Retrieved from http://www.youtube.com/watch?v=Vja83KLQXZs

Tables
Tables should be self-contained and complement, not duplicate, information contained in the text. They should be supplied as editable files, not pasted as images. Legends should be concise but comprehensive – the table, legend, and footnotes must be understandable without reference to the text. All abbreviations must be defined in footnotes. Footnote symbols: †, ‡, §, ¶, should be used (in that order) and *, **, *** should be reserved for P-values. Statistical measures such as SD or SEM should be identified in the headings.

Figure Legends
Legends should be concise but comprehensive – the figure and its legend must be understandable without reference to the text. Include definitions of any symbols used and define/explain all abbreviations and units of measurement.

Figures
Although we encourage authors to send us the highest-quality figures possible, for peer-review purposes we are happy to accept a wide variety of formats, sizes, and resolutions. Click here for the basic figure requirements for figures submitted with manuscripts for initial peer review, as well as the more detailed post-acceptance figure requirements.
Figures submitted in colour may be reproduced in colour online free of charge. Please note, however, that it is preferable that line figures (e.g. graphs and charts) are supplied in black and white so that they are legible if printed by a reader in black and white.

Guidelines for Cover Submissions
If you would like to send suggestions for artwork related to your manuscript to be considered to appear on the cover of the journal, please follow these general guidelines.

Additional Files

Appendices

Appendices will be published after the references. For submission they should be supplied as separate files but referred to in the text.

Supporting Information

Supporting information is information that is not essential to the article but that provides greater depth and background. It is hosted online, and appears without editing or typesetting. It may include tables, figures, videos, datasets, etc. Click here for Wiley's FAQs on supporting information. Note, if data, scripts or other artefacts used to generate the analyses presented in the paper are available via a publicly available data repository, authors should include a reference to the location of the material within their paper.

General Style Points

The following points provide general advice on formatting and style:

- **Abbreviations:** In general, terms should not be abbreviated unless they are used repeatedly and the abbreviation is helpful to the reader. Initially, use the word in full, followed by the abbreviation in parentheses. Thereafter use the abbreviation only.
- **Units of measurement:** Measurements should be given in SI or SI-derived units. Visit the Bureau International des Poids et Mesures (BIPM) website at www.bipm.fr for more information about SI units.
- **Spellings:** should conform to those used in the Concise Oxford Dictionary.
- **Footnotes:** should be avoided.

Wiley Author Resources

Manuscript Preparation Tips

Wiley has a range of resources for authors preparing manuscripts for submission available here. In particular, authors may benefit from referring to Wiley's best practice tips on Writing for Search Engine Optimization.

Article Preparation Supports

Wiley Editing Services offers expert help with English Language Editing, as well as translation, manuscript formatting, figure illustration, figure formatting, and graphical abstract design – so you can submit your manuscript with confidence. Also, check out our resources for Preparing Your Article for general guidance about writing and preparing your manuscript.

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Editorial Review and Acceptance

The acceptance criteria for all papers are the quality and originality of the research and its significance to journal readership.

Peer-Review

JPMHN operates a double blind peer review process. The exception to this is for randomized controlled trials where reviewers will be informed of the trial registration number. This will make it possible for them to break blinding when they check the trial protocol. Papers will only be sent to review if the Editor-in-Chief determines that the paper meets the appropriate quality and relevance requirements. Typically two reviewers will review the manuscript. If a statistical review is required a specialist statistical reviewer will do this. If your paper is rejected by the editor and not sent for peer-review we aim to communicate this decision with you within 7 days of submission.
Wiley's policy on confidentiality of the review process is available here.

Research Misconduct

Research Misconduct is defined by the US Federal Policy on Research Misconduct as “fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results." Allegations of suspected misconduct that have specific, detailed evidence to support the claim are investigated appropriately by the Editor-in-Chief in conjunction with the Publisher, whether they are raised anonymously or by named "whistle-blowers".

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Authors can appeal a decision within 28 days of receiving the decision. The appeal should be in the form of an email addressed to the JPMHN editorial office (jpmhnedoffice@wiley.com). The letter should include clear grounds for the appeal, including specific points of disagreement with the decision. The appeal will be assessed by at least three members of the editorial team, one of whom will be the Editor-in-Chief. You will be informed of the outcome of the appeal within 28 days from receipt of your email. The decision will be final.

Editorial Decisions

JPMHN welcomes Editors to publish in the journal. JPMHN ensures that Editors and editorial team members are not involved in the peer-review and editorial decisions when they are authors or have contributed to a manuscript.

Data storage and documentation

Journal of Psychiatric and Mental Health Nursing expects that data supporting the results in the paper will be archived in an appropriate public repository. Whenever possible the scripts and other artefacts used to generate the analyses presented in the paper should also be

publicly archived. Exceptions may be granted at the discretion of the editor for sensitive information such as human subject data or the location of endangered species. Authors are expected to provide a data accessibility statement, including a link to the repository they have used, to accompany their paper. In cases where data cannot be publicly shared, authors are expected to include a rationale in their data accessibility statement to accompany the paper.

Authors can consult the global registry of research data repositories re3data.org to help them identify registered and certified repositories relevant to their subject areas.

Data Citation In recognition of the significance of data as an output of research effort, Wiley has endorsed the FORCE11 Data Citation Principles and is implementing a mandatory data citation policy. Journal policies should require data to be cited in the same way as article, book, and web citations and authors are required to include data citations as part of their reference list. Data citation is appropriate for data held within institutional, subject focused, or more general data repositories. It is not intended to take the place of community standards such as in-line citation of GenBank accession codes. When citing or making claims based on data, authors must refer to the data at the relevant place in the manuscript text and in addition provide a formal citation in the reference list. We recommend the format proposed by the Joint Declaration of Data Citation Principles.

Authors; Year; Dataset title; Data repository or archive; Version (if any); Persistent identifier (e.g. DOI)

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For manuscripts reporting medical studies involving human participants, we require a statement identifying the ethics committee that approved the study, and that the study conforms to recognized standards, for example: Declaration of Helsinki; US Federal Policy for the Protection of Human Subjects; or European Medicines Agency Guidelines for Good Clinical Practice.

Images and information from individual participants will only be published where the authors have obtained the individual's free prior informed consent. Authors do not need to provide a copy of the consent form to the publisher, however in signing the author license to publish authors are required to confirm that consent has been obtained. Wiley has a standard patient consent form available for use.

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We require that clinical trials are prospectively registered in a publicly accessible database such as: http://clinicaltrials.gov/ and clinical trial registration numbers should be included in all papers that report their results. Please include the name of the trial register and your clinical trial registration number at the end of your abstract. If your trial is not registered, or was registered retrospectively, please explain the reasons for this.

Research Reporting Guidelines

Accurate and complete reporting enables readers to fully appraise research, replicate it, and

use it. We expect authors to adhere to the following guidelines:

- CONSORT checklist for reports of randomised trials and cluster randomised trials
- TREND checklist for non-randomised controlled trials
- PRISMA guidelines for systematic reviews and meta-analyses
- SRQR or CASP checklist for qualitative studies
- SQUIRE checklist for quality improvement

See the EQUATOR Networkfor other study types.

Conflict of Interest

Authors are required to complete a conflict of interest form (in order to access the COI PDF, Adobe Reader or Adobe Acrobat needs to be your browser's default PDF viewer. See how to set this up for Internet Explorer, Firefox, and Safari at https://helpx.adobe.com/acrobat/using/display-pdf-in-browser.html. Google Chrome and Microsoft Edge do not support Adobe Reader or Adobe Acrobat as a PDF Viewer. We recommend using Internet Explorer, Firefox or Safari). This will generate a conflict of interest statement to provide during the submission process. Authors should ensure they liaise with all co-authors to confirm agreement with the final statement.

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Individual Editor and Editorial Board conflicts of interest statements are available on the Editorial Board contact page.

Funding

Authors should list all funding sources in the Acknowledgments section. Authors are responsible for the accuracy of their funder designation. If in doubt, please check the Open Funder Registry for the correct nomenclature: http://www.crossref.org/fundingdata/registry.html

Authorship

The list of authors should accurately illustrate who contributed to the work and how. All

those listed as authors should qualify for authorship according to the following criteria:

1. Have made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data;
2. Been involved in drafting the manuscript or revising it critically for important intellectual content;
3. Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content; and
4. Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Contributions from anyone who does not meet the criteria for authorship should be listed, with permission from the contributor, in an Acknowledgments section (for example, to recognize contributions from people who provided technical help, collation of data, writing assistance, acquisition of funding, or a department chairperson who provided general support).
When submitting a manuscript authored by a group, the corresponding author should clearly indicate the preferred citation and identify all individual authors as well as the group name. Prior to submitting the article all authors should agree on the order in which their names will be listed in the manuscript.

Additional Authorship Options
Joint first or senior authorship: In the case of joint first authorship, a footnote should be added to the author listing, e.g. 'X and Y should be considered joint first author' or 'X and Y should be considered joint senior author.'

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The Preregistered badge recognizes researchers who preregister their research plans (research design and data analysis plan) prior to engaging in research and who closely follow the preregistered design and data analysis plan in reporting their research findings. The criteria for earning this badge thus include a date-stamped registration of a study plan in such venues as the Open Science Framework (https://osf.io) or Clinical Trials (https://clinicaltrials.gov) and a close correspondence between the preregistered and the implemented data collection and analysis plans.

Authors will have an opportunity at the time of manuscript submission and at the time of acceptance to inform themselves of this initiative and to determine whether they wish to participate. Applying and qualifying for Open Science badges is not a requirement for publishing with the Journal of Psychiatric and Mental Health Nursing, but these badges are further incentive for authors to participate in the open science movement and thus to increase the visibility and transparency of their research.

More information about the Open Practices badges is available from the Open Science Framework wiki.

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8. POST PUBLICATION

Access and sharing

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9. EDITORIAL OFFICE CONTACT DETAILS

For queries about submissions, please contact: JPMHNedoffice@wiley.com .

Appendix B. Journal of Psychiatric Research Author Guidelines

Description

Founded in 1961 to report on the latest work in psychiatry and cognate disciplines, the Journal of Psychiatric Research is dedicated to innovative and timely studies of four important areas of research:
(1) clinical and translational studies of all disciplines relating to psychiatric illness, as well as normal human behaviour, including biochemical, physiological, genetic, environmental, social, psychological and epidemiological factors;
(2) basic studies pertaining to psychiatry in such fields as neuropsychopharmacology, neuroendocrinology, electrophysiology, genetics, experimental psychology and epidemiology;
(3) the growing application of clinical laboratory techniques in psychiatry, including imagery and spectroscopy of the brain, molecular biology and computer sciences;
(4) advances in basic and clinical research methodology, including the process of "bench-to-bedside" transfer of new research findings.
The Editors-in-Chief will accept papers of high scientific caliber, after appropriate revision, if necessary, and will aim for their rapid publication. In addition, the Journal will be enhanced by the inclusion of commissioned reviews, news items, book notices and letters to the Editors.

Submission checklist

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:
• E-mail address
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All necessary files have been uploaded:
Manuscript:
• Include keywords
• All figures (include relevant captions)
• All tables (including titles, description, footnotes)
• Ensure all figure and table citations in the text match the files provided
• Indicate clearly if color should be used for any figures in print
Graphical Abstracts / Highlights files (where applicable)
Supplemental files (where applicable)
Further considerations
• Manuscript has been 'spell checked' and 'grammar checked'
• All references mentioned in the Reference List are cited in the text, and vice versa
• Permission has been obtained for use of copyrighted material from other sources (including the Internet)
• A competing interests statement is provided, even if the authors have no competing interests to declare

• Journal policies detailed in this guide have been reviewed
• Referee suggestions and contact details provided, based on journal requirements
For further information, visit our Support Center.

Before you begin

Submissions types and word limits

Journal of Psychiatric Research considers four types of manuscripts for possible publication:
1. Original articles: Original articles are limited to 4,000 words in the text body, excluding abstract, references, figure legends, acknowledgement and disclosures.
2. Short communications:Short communications are brief reports on preliminary new findings limited to 2500 words, excluding abstract, references, figure legends, acknowledgement and disclosures. Authors may include up to 4 figures and up to 2 tables.
3. Review articles: Review articles should not exceed 6,000 words, excluding abstract, references, figure legends, acknowledgement and disclosures.
4. Letters to the Editor: Letters to the Editor may be considered for publication if they include important general comments or comments on a previous paper or letter in the Journal. The title of the letter should begin with "Letter to the Editor: ?" or, in the case of a reply to a previous letter, with "Reply to ?". The text does not include an abstract and is limited to 1,000 words. One figure or one table may be included.

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Ethics in publishing

Please see our information on Ethics in publishing.

Ethical Considerations

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Reporting sex- and gender-based analyses

Reporting guidance

For research involving or pertaining to humans, animals or eukaryotic cells, investigators should integrate sex and gender-based analyses (SGBA) into their research design according to funder/sponsor requirements and best practices within a field. Authors should address the sex and/or gender dimensions of their research in their article. In cases where they cannot,

they should discuss this as a limitation to their research's generalizability. Importantly, authors should explicitly state what definitions of sex and/or gender they are applying to enhance the precision, rigor and reproducibility of their research and to avoid ambiguity or conflation of terms and the constructs to which they refer (see Definitions section below). Authors can refer to the Sex and Gender Equity in Research (SAGER) guidelines and the SAGER guidelines checklist. These offer systematic approaches to the use and editorial review of sex and gender information in study design, data analysis, outcome reporting and research interpretation - however, please note there is no single, universally agreed-upon set of guidelines for defining sex and gender.

Definitions

Sex generally refers to a set of biological attributes that are associated with physical and physiological features (e.g., chromosomal genotype, hormonal levels, internal and external anatomy). A binary sex categorization (male/female) is usually designated at birth (""sex assigned at birth""), most often based solely on the visible external anatomy of a newborn. Gender generally refers to socially constructed roles, behaviors, and identities of women, men and gender-diverse people that occur in a historical and cultural context and may vary across societies and over time. Gender influences how people view themselves and each other, how they behave and interact and how power is distributed in society. Sex and gender are often incorrectly portrayed as binary (female/male or woman/man) and unchanging whereas these constructs actually exist along a spectrum and include additional sex categorizations and gender identities such as people who are intersex/have differences of sex development (DSD) or identify as non-binary. Moreover, the terms ""sex"" and ""gender"" can be ambiguous—thus it is important for authors to define the manner in which they are used. In addition to this definition guidance and the SAGER guidelines, the resources on this page offer further insight around sex and gender in research studies.

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Article structure

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Abstract

Please include an abstract of no more than 250 words in single paragraph format.

Keywords

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

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State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

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Provide detailed information regarding the study population investigated and methods used. Thoroughly explain statistical procedures.

For studies reporting results obtained in humans, include a statement that 1) the investigation was carried out in accordance with the latest version of the Declaration of Helsinki, 2) the study design was reviewed by an appropriate ethical committee, and 3) informed consent of the participants was obtained after the nature of the procedures had been fully explained.

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Results

Results of the study may be represented in tables or figures, as authors deem appropriate. However, do not duplicate presentation (e.g. do not repeat numerical data from tables in the text). It is not appropriate to present means or medians exclusively; please also provide measures of values distribution.

Discussion

This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature. Discussion of study results should be placed within the appropriate context of knowledge and include discussion of study limitations and implications for future work.

Highlights

Highlights are optional yet highly encouraged for this journal, as they increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the novel results of your research as well as new methods that were used during the study (if any). Please have a look at the example Highlights.

Highlights should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point).

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Artwork

Electronic artwork

General points

• Make sure you use uniform lettering and sizing of your original artwork.
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• Aim to use the following fonts in your illustrations: Arial, Courier, Times New Roman, Symbol, or use fonts that look similar.
• Number the illustrations according to their sequence in the text.
• Use a logical naming convention for your artwork files.
• Provide captions to illustrations separately.
• Size the illustrations close to the desired dimensions of the published version.
• Submit each illustration as a separate file.
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TIFF (or JPEG): Color or grayscale photographs (halftones), keep to a minimum of 300 dpi.
TIFF (or JPEG): Bitmapped (pure black & white pixels) line drawings, keep to a minimum of 1000 dpi.
TIFF (or JPEG): Combinations bitmapped line/half-tone (color or grayscale), keep to a minimum of 500 dpi.

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• Supply files that are too low in resolution;
• Submit graphics that are disproportionately large for the content.

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Reference to a book:

Strunk Jr., W., White, E.B., 2000. The Elements of Style, fourth ed. Longman, New York.

Reference to a chapter in an edited book:

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Appendix C. Patient Public Involvement meeting minutes

Two focus groups were carried out for patient, public involvement (PPI) purposes. To thank both teams for their valuable time this research will be presented to both teams on completion. In both meetings, there were professionals from the wider multidisciplinary team and there were also peer support workers with lived experience. An introduction to the research proposal explained that autistic spectrum disorder (ASD) and narcissistic personality disorder (NPD) would be reviewed with a focus on empathy challenges. The research methodology of systematic review and meta-analysis was also described. It should be noted that both teams work with adults rather than children which also aligned with the inclusion criteria.

PPI focus group on 30 November 2022: Personality Disorder Community Service (PDCS) from Cambridge and Peterborough (CPFT) Cambridgeshire and Peterborough NHS Foundation Trust.

I was asked to clarify which presentation the research would cover or whether it would include both. I clarified that the research would include both ASD and NPD. The group discussed a huge stigma of Narcissism and ASD. They discussed Narcissistic empathy as appearing to come across in a manipulative way. We discussed the impact of the word narcissistic and negative connotations. Experienced colleagues in the team noted that in over nine years, they have worked with one person with NPD and we wondered why that is. I was asked whether there are positive characteristics of narcissistic personality disorder are apparent. They discussed the recent media coverage of Amber Heard and Johnny Depp's trial, whereby they were both alleged to have traits or symptoms of NPD.

When working with people with a personality disorder they felt the work was more focused on meeting the person's emotional needs. They discussed what it feels like in the room and that when working with NPD it feels more uncomfortable and when working with ASD it feels more comfortable. The team explained that they use a psychodynamic approach

often. They noted that when working with ASD it is important to be explicit with language without using metaphors. Yet, when working with Narcissism the therapy work is about being mindful of the presentation and as a therapist being mindful of our reactions.

The team shared knowledge that people with ASD can experience hyper-empathy. They discussed neurodivergence and double empathy which can come from not understanding. They discussed positive media of ASD e.g. Greta Thunberg and positive media about her. Someone shared a positive quote; ‘’without people with ASD we would all be living in a cave’’. The team also discussed ‘’autistic mumblings’’ and the team recommended that I follow on twitter #autismnotpd. We discussed that the ICD-11 diagnosis for a personality disorder was leaning more towards a severity approach similar to the spectrum approach used in ASD.

I was asked if I would include people without a diagnosis. As they have expanded their inclusion criteria for their service. The team are interested in what type of services are conducting this research. They suggested a needs-led assessment instead of a formulation-based approach for NPD to focus on strengths and areas of challenges and ask what makes it easier. The group discussed the Coventry grid, and they would like an equivalent of the Coventry grid. But for ASD and empathy overlap. The team discussed programmes for empathy. But had outstanding questions such as what do we understand about what empathy is? How do we understand empathy? Finally, the team were interested in the gender prevalence.

PPI focus group on 09 December 2022: Cambridgeshire Lifespan Asperger Syndrome Service (CLASS) clinic from Cambridge and Peterborough (CPFT) Cambridgeshire and Peterborough NHS Foundation Trust.

The CLASS team explained that they have been interested in comorbidity and they have researched into their caseload and the overlap of EUPD and ASD. They think that ASD is less stigmatizing than PD. In terms of differential diagnosis, they would like to know what the differences are and how does NPD differ from other personality disorders. The team would also be interested in a differential diagnosis tool looking at sensitivity and specificity, to ask whether the presentation is due to the diagnosis and if the diagnosis captures what it is supposed to capture. The CLASS team recommended including people with a learning disability (LD) too as they found when excluding people with an LD in their research, they lost too much data. They explained that pure ASD with no LD will exclude too much.

The team noted that NPD is more present in forensic settings. They are interested in where the research papers have been sourced from and wondering if there are a lot of forensic samples. Additionally, they would like to know whether the research is community-based and therefore whether it transfers to their team. The CLASS team also thought that ASD and NPD were forensic-dominated discussions.

The CLASS team use the *Triple A (Adult Asperger Assessment) in assessment which includes the Empathy Quotient (EQ) as NICE recommends the tools as they are gold standard. The team recommended the Relatives Questionnaire (RQ) that they use to gather developmental history. We discussed how equivalent ICD- DSM are in terms of being an American versus UK diagnostic classification system. We discussed the PDD NOS Pervasive Developmental Disorder- Not Otherwise specified.

Appendix D. NPD and ASD Search Strategy

Medline, Web of Science, Cochrane Central Register of Controlled Trials (CENTRAL) in the Cochrane Library, PsycINFO and Embase electronic databases were searched in February 2023.

The search strategy used across all databases was as follows:

Restrictions were selected so that articles prior to 1980 were not retrieved.

Narcissism AND Autis*

Narcissism AND Asperger*

Narcissism AND ASD

Narcissism AND ASC

Narcissism AND Kanner*

Narcissism AND Autis* AND Empathy

Narcissism AND Asperger* AND Empathy

Narcissism AND ASD AND Empathy

Narcissism AND ASC AND Empathy

Narcissism AND ASC AND Kanner* AND Empathy

Narcissism AND Autis* AND Theory of Mind

Narcissism AND Asperger* AND Theory of Mind

Narcissism AND ASD AND Theory of Mind

Narcissism AND ASC AND Theory of Mind

Narcissism AND ASC AND Kanner* AND Theory of Mind

Narcissistic Personality Disorder* AND Autis*

Narcissistic Personality Disorder* AND Asperger*

Narcissistic Personality Disorder* AND ASD

Narcissistic Personality Disorder* AND ASC

Narcissistic Personality Disorder* AND Kanner*

Narcissistic Personality Disorder* AND Autis* AND Empath*

Narcissistic Personality Disorder* AND Asperger* AND Empath*

Narcissistic Personality Disorder* AND ASD* AND Empath*

Narcissistic Personality Disorder* AND ASC* AND Empath*

Narcissistic Personality Disorder* AND ASC* AND Kanner* AND Empath*

Narcissistic Personality Disorder* AND Autis* AND Theory of Mind

Narcissistic Personality Disorder* AND Asperger* AND Theory of Mind

Narcissistic Personality Disorder* AND ASD AND Theory of Mind

Narcissistic Personality Disorder* AND ASC AND Theory of Mind

Narcissistic Personality Disorder* AND ASC AND Kanner* AND Theory of Mind

Narcissism AND Autis* OR Asperger* OR ASD OR ASC OR Kanner*

Narcissism AND Autis* OR Asperger* OR ASD OR ASC OR Kanner* AND Empathy

Narcissism AND Autis* OR Asperger* OR ASD OR ASC OR Kanner AND Theory of Mind

Narcissistic Personality Disorder* AND Autis* OR Asperger* OR ASD OR ASC OR Kanner*

Narcissistic Personality Disorder* AND Autis* OR Asperger OR ASD OR ASC OR Kanner AND Empath*

Narcissis* AND (Autis* OR Asperger* OR ASD OR ASC OR Kanner*) AND (Empath* OR Theory of Mind)

Google Scholar was also used to identify any Grey Literature.

Appendix E. SR NPD and ASD Reasons for Exclusion

Study	Title of article	Reason for Exclusion
Ali and Chamorro-Premuzic, (2010)	Investigating Theory of Mind deficits in nonclinical psychopathy and Machiavellianism	Non-ASD/NPD population
Cheek and Norem (2022)	Individual differences in anchoring susceptibility: Verbal reasoning, autistic tendencies, and narcissism	
Crossley et al.(2016)	The dark side of negotiation: Examining the outcomes of face-to-face and computer-mediated negotiations among dark personalities	Non-ASD/NPD population
Decety and Moriguchi (2007)	The empathic brain and its dysfunction in psychiatric populations: implications for intervention across different clinical conditions	Review
Fabiano and Haslam (2020)	Diagnostic inflation in the DSM: A meta-analysis of changes in the stringency of psychiatric diagnosis from DSM-III to DSM-5	No clear outcome
Fusar-Poli et al. (2017)	Diagnosing ASD in Adults Without ID: Accuracy of the ADOS-2 and the ADI-R	No clear outcome
Gensler (2012)	Autism spectrum disorder in DSM-V: Differential diagnosis and boundary conditions	Does not meet research quality
Greenberg et al. (2017)	Mentalized affectivity: A new model and assessment of emotion regulation	criteria
Johnson et al (2022)	The association between mentalizing and psychopathology: A meta-analysis of the reading the mind in the eyes task across psychiatric disorders	Non-ASD/NPD population
Kajonius and Bjorkman (2020)	Individuals with dark traits have the ability but not the disposition to empathize	Non-ASD/NPD population
Konrath (2008)	Egos inflating over time: Rising narcissism and it implications for self-construal, cognitive style, and behavior	Review
Kose et al.(2018)	Reliability, validity, and factorial structure of the Turkish version of the Empathy Quotient (Turkish EQ)	Non-ASD/NPD population
Kramer et al (2020)	The special brain: Subclinical grandiose narcissism and self-face recognition in the right prefrontal cortex	Non-ASD/NPD population
Kring (2008)	Emotion disturbances as transdiagnostic processes in psychopathology	Does not meet research quality
Kristiansson and Sorman (2008)	Autism spectrum disorders - Legal and forensic psychiatric aspects and reflections	criteria
Mansour (2012)	Concept, diagnostic criteria and classification of autistic disorders A proposed new model	Review

Megremi (2016)	Autism: A disorder related to the capacity to love	Does not meet research quality
Megremi (2017)	Autism as a "Narcissistic" disorder: Social implications	Does not meet research quality
Mizen (2014)	Narcissistic disorder and the failure of symbolisation: A Relational Affective Hypothesis	Does not meet research quality
Mizen (2015)	Neuroscience, mind and meaning An attempt at synthesis in a Relational Affective Hypothesis	criteria
Preston et al. (2020)	Understanding empathy and its disorders through a focus on the neural mechanism	criteria
Roepke and Vater (2014)	Narcissistic Personality Disorder: An Integrative Review of Recent Empirical Data and Current Definitions	Review
Spero (1998)	The emancipation of time from autistic encapsulation: A study in the use of countertransference	Review
Strunz et al (2014)	Comorbid Psychiatric Disorders and Differential Diagnosis of Patients with Autism Spectrum Disorder without Intellectual Disability	Not fully translated to English
Sugarman (2017)	The Importance of Mental Organization (or Character Structure) When Diagnosing and Analyzing Asperger's Patients	Does not meet research quality
Thoma et al. (2013)	Empathy and social problem solving in alcohol dependence, mood disorders and selected personality disorders	criteria
Turner et al. (2019)	The Dark Triad's inverse relations with cognitive and emotional empathy: High-powered tests with multiple measures	Non-ASD/NPD population
Tyrer and Seivewright (2008)	Stable instability: the natural history of personality disorders	Review
Urbonaviciute and Hepper (2020)	When is narcissism associated with low empathy? A meta-analytic review	Non-ASD/NPD population
Ventegodt et al. (2012)	Holistic psychiatry: A model for holistic diagnoses and holistic treatment of mild, borderline and psychotic personality disorders	Non-ASD/NPD population
Vonk et al (2013)	Mirror, mirror on the wall, which form of narcissist knows self and others best of all?	Non-ASD/NPD population
Wai and Tiliopoulos (2012)	The affective and cognitive empathic nature of the dark triad of personality	Non-ASD/NPD population

Appendix F. Appraisal tool for Cross-Sectional Studies (AXIS)

Critical appraisal (CA) is used to systematically assess research papers and to judge the reliability of the study being presented in the paper. CA also helps in assessing the worth and relevance of the study [1]. There are many key areas to CA including assessing suitability of the study to answer the hypothesised question and the possibility of introducing bias into the study. Identifying these key areas in CA requires good reporting of the study, if the study is poorly reported the appraisal of suitability and bias becomes difficult.

The following appraisal tool was developed for use in appraising observational cross-sectional studies. It is designed to address issues that are often apparent in cross-sectional studies and to aid the reader when assessing the quality of the study that they are appraising. The questions on the following pages are presented in the order that they should generally appear in a paper. The aim of the tool is to aid systematic interpretation of a cross-sectional study and to inform decisions about the quality of the study being appraised.

The appraisal tool comes with an explanatory help text which gives some background knowledge and explanation as to what the questions are asking. The explanations are designed to inform why the questions are important. Clicking on a question will automatically take you to the relevant section in the help text. The appraisal tool has areas to record a "yes", "no" or "don't know" answer for each question and there is room for short comments as well.

	Question	**Yes**	**No**	**Don't know/ Comment**
Introduction				
1	Were the aims/objectives of the study clear?			
Methods				
2	Was the study design appropriate for the stated aim(s)?			
3	Was the sample size justified?			
4	Was the target/reference population clearly defined? (Is it clear who the research was about?)			
5	Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?			
6	Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?			
7	Were measures undertaken to address and categorise non-responders?			
8	Were the risk factor and outcome variables measured appropriate to the aims of the study?			

9	Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?			
10	Is it clear what was used to determined statistical significance and/or precision estimates? (e.g. p-values, confidence intervals)			
11	Were the methods (including statistical methods) sufficiently described to enable them to be repeated?			
Results				
12	Were the basic data adequately described?			
13	Does the response rate raise concerns about non-response bias?			
14	If appropriate, was information about non-responders described?			
15	Were the results internally consistent?			
16	Were the results presented for all the analyses described in the methods?			
Discussion				
17	Were the authors' discussions and conclusions justified by the results?			
18	Were the limitations of the study discussed?			
Other				
19	Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?			
20	Was ethical approval or consent of participants attained?			

Introduction

The introduction serves to establish the context of the work that is about to be presented in the text of the paper. Relevant primary literature should be discussed and referenced throughout the introduction. The history and current understanding of the problem being researched should be presented. This should be concluded giving a rational as to why the current study is being presented and what the aims and/or hypothesis under investigated are [2,3].

Aims

The aim(s) of the study tells us if the study addresses an appropriate and clearly focused question. If the aim is not clearly stated or not stated at all, it will be difficult and in some cases impossible to assess the extent to which the study objectives were achieved. Ideally, an aim should be stated both at the beginning of the abstract and at the end of the introduction [3]. If the answer to question 1 is no, then it will make it difficult to assess some of the other questions in the critical appraisal process.

Methods

The methods section is used to present the experimental study design of the paper. The methods should be described clearly in easy to understand language and clearly identify measures, exposures and outcomes being used in the study [4]. More specific issues are addressed below.

Study Design

Question 2 is used to assess the appropriateness of using a cross-sectional study to achieve the aim(s) of the study. Cross-sectional studies are observational studies that provide a description of a population at a given time, and are useful in assessing prevalence and for testing for associations and differences between groups [5]. Examples of cross-sectional designs include point-in-time surveys, analysis of records and audits of practice [6]. The reader should try and decipher if a cross-sectional study design is appropriate for the questions being asked by the researcher.

Sample Size Justification

Sample size justification is crucial as sample size profoundly affects the significance of the outcomes of the study. If the sample size is too small then the conclusions drawn from the study will be under powered and may be inaccurate. This can occur by failing to detect an effect which truly exists (type II error) sometimes referred to as a "false negative". The probability of a type I error is also taken into account when determining sample size. A type I error is drawing significant conclusions when no real difference exists and is a function of the p-value (see Statistics section below) sometimes referred to as a "false positive".

Question 3 asks if sample size justification was reported, but it should also be clear what methods were used to determine the sample size. In some cases clustering of observations within groups can occur (e.g. patients within hospitals or livestock within herds) and this should be taken into account if sample size has been determined. It should be clear whether the inferences drawn actually relate to the attributes for which the sample size was calculated [7]. If sample size justification isn't given or restrictions make it difficult to reach the desired sample size then this should be declared in the text.

Target (Reference) Population

The target or reference population is the overall population that the research is directed towards. When doing a crosssectional study, a target population is the overall population you are undertaking the study to make conclusions about or the population at risk of acquiring the condition being investigated [8–10] e.g. the total female population in the UK, or all dogs in the USA with cardiovascular disease. (See Figure 1) Question 4 asks if this is clearly defined in the study. It is important that this is understood both by the researcher and the reader; if it is not clearly defined then inferences made by the researcher may be inappropriate.

Sampling Frame

As a reader you need to determine if the sample frame being used is representative of the target population. The study population should be taken from the target population; units from this study population have information that is accessible and available which allows them to be placed in the study. The sampling frame is the list or source of the study population that the researcher has used when trying to recruit participants into the study (Figure 1). Ideally it should be exactly the same composition or structure as the target population. In practice it is generally much smaller, but should still be representative of the target population. Generally, for convenience, the sampling frame is a list of units that are within the target population e.g. list of telephone owning households, computerised patient records etc. A sample of units is selected from the study population to take part in the study and is generally only a small proportion of the study population (see Sample Selection below) - this proportion ratio is known as the sampling fraction. It is very important that the sampling frame is representative of the target population as results from the study are going to be used to make assumptions about the target population [8–10].

Convenience sampling can be carried out in some situations and are used because the participants are easy to recruit. Convenience samples generally lead to non-representative or biased samples and therefore cannot be used to make assumptions about the characteristics of the target population [11]. Convenience samples are often used for pilot or analytical studies where the need for a representative sample is not required [12], however the authors should make this clear in the text.

Census

A census is where the target population and the study participants are the same at the time the census is taken. In theory questions 5, 6 and 7 don't apply to census studies. However even if a study is described as a census it should be very clearly stated where the study participants have been recruited from, and the reader should make the decision if the study truly is a census. A census may include all the population from the sample frame, but not all the target population; in this scenario questions 5 to 7 need to be addressed.

Sample Selection

Question 6 is used to establish how the researchers got from the sample frame to the participants in the study. It examines the potential for selection bias and how the researcher developed methods to deal with this. The sample selection process is important in determining to what extent the results of the study are generalizable to the target population. For question 6 we are looking in depth at how the sample (study participants) was selected from the sampling frame. It is important to know if there were any inclusion or exclusion criteria used, as inappropriate criteria can dramatically shift how representative the sample is of the target population [8,10,13].

Selection bias can occur if every unit in the sample frame doesn't have an equal chance of been included in the final study [11,14].

Randomisation is used to ensure that each participant in the sampling frame has an equal chance of being included in the sample. If methods of randomisation are not used, not

described or are not truly random, this may lead to a non-representative sample being selected and hence affect the results of the study [10,11].

There are many other situational issues to take into account when determining if the population in the sample is likely to represent the target population. Often these issues are outside the control of the researcher, but sometimes are overlooked. One such issue is the healthy worker effect which is a well-known phenomenon in human crosssectional studies [13]. An example of this is, a researcher trying to do a cross-sectional study to determine health factors in a factory population and decides to sample from workers at work on a particular day. Unfortunately there is a tendency to over select healthy workers as ill workers may tend to be at home on the day of selection. This will in turn lead to inferences been made about the health of the worker population but is only relevant to healthy workers and not ill workers. A veterinary example of this is a researcher trying to do a cross-sectional study to determine health factors in the general dog population and decides to sample from a local park. Unfortunately there is a tendency to over select healthy animals as sick animals will tend to be left at home and not taken for a walk. This will in turn lead to inference been made about the health of the dog population but is only relevant to healthy dogs and not sick dogs. Self-selection is another example of selection bias that can be introduced and should be assessed [13]. For example, when using a postal questionnaire to examine eating habits and weight control, people who are overweight might read the survey and be less inclined to complete and return the survey than those with normal weight leading to over representation of people with normal weight. Similarly, if using a postal questionnaire to examine mastitis levels on cattle farms, farmers that have a high somatic cell counts (SCC) might be less inclined to complete the survey than those with normal or low SCC leading to over representation of farms with good SCC (see Non-responders below).

Non-responders

Non-response in cross-sectional studies is a difficult area to address. A non-responder is someone who does not respond either because they refuse to, cannot be contacted, or because their details cannot be documented. As a rule, if participants don't respond it is often difficult and sometimes impossible to gain any information about them. However other baseline statistics may exist that can be used as a comparator to assess how representative the sample is [14] e.g. age, sex, socio-economic classification. Methods used, if any, should be well described so that the results from the analyses can be interpreted. This is important as nonresponders may be from a specific group, which can lead to a shift in the baseline data away from that group. This shift can lead to results that don't represent the target population. In some situations the sampling frame doesn't have a finite list or a fully defined baseline population. This also makes it difficult, and in some cases impossible, to quantify nonresponse and it may be inappropriate to do so in these situations. If the researchers are using non-defined populations this should also be declared clearly in the materials and methods section [15,16].

Measurement Validity & Reliability

Measurement validity is a gauge of how accurately the study measurements used assess the concepts that the researcher is attempting to explore. Measurement reliability is a gauge of

the accuracy of the measurements taken or the procedures used during the study. Question 8 is used to address the concepts of measurement validity, and is specifically aimed to address the appropriateness of the measurements being used.

The importance of measurement validity is that it gives weight to applying the statistical inferences from the study to members of the target population. If inappropriate measures are used in the study it could lead to misclassification bias and it will be difficult to determine to what extent the study results are relevant to the target population [12,17].

Question 9 is an attempt to gauge the measurement reliability of the study measures. Measurements must be able to be reproduced and produce identical results if measured repeatedly, so that the measurements would be exactly the same if performed by another researcher. With this in mind, the measurements must be of international or globally accepted standards (e.g. IU standards) where possible and appropriate. If they are being used for the first time they must be trialled, or in the case of questionnaires, they should be piloted before being used.

Statistics

While interpretation of statistics can be quite difficult, a basic understanding of statistics can help you to assess the quality of the paper. Often many different methods can be used correctly to test the same data, but as there is such a wide range available, knowing what tests are most appropriate in particular situations can be hard to decipher. There is an expectation that the researcher has this understanding or has at least sought statistical assistance to ensure that the correct methods are used. Therefore for question 10 the emphasis for the reader is that the statistical methods, software packages used and the statistical significance levels are clearly stated even if the paper is just presenting descriptive statistics. The statistical significance level is usually described as a p-value. In most cases the p-value, at which the null hypothesis is rejected, is set at 0.05. The higher the p-value is set the greater the possibility of introducing a type I error. Confidence intervals should also be declared with p-values or instead of p-values as an indication of the precision of the estimates. It is usual to present a confidence interval of 95% which means that the researchers were 95 per cent confident that the true population value of the outcome lies between these intervals. This can be used to compare groups where an overlap would suggest no difference and a gap between confidence intervals would suggest a difference (Figure 2).

Overall Methods

Question 11 asks if the methods are sufficiently described to enable them to be repeated. If there are sections or even small pieces of information missing it could make a great difference for the reader when interpreting the results and the discussion as they may be unsure if the correct methods are being used. Results The results section of a paper is solely for the purpose of declaring the results of the data analysis and no opinion should be stated in this section. This gives the reader the opportunity to examine the results unhindered by the opinion of the researcher. It is important for the reader to form their own ideas or opinions about the results before progressing to the discussion stages. Basic Data Question 12 asks for a description of

the basic data. Basic descriptive analysis aims to summarise the data, giving detailed information about the sample and the measurements taken in the study. The basic data gives an overview of the process of recruitment and if the sampling methods used to recruit individuals were successful in selecting a representative sample of the target population. If the sampling methods are unsuccessful in selecting a representative sample of the target population, those participants included in the study can often be different to the target population; this leads to inaccurate estimates of prevalence, incidence or risk factors for disease. Descriptive data of the measurements taken in the study give an overview of any differences between the groups, and may give insight into some of the reasons for statistical inferences that are made later in the paper.

Response Rate

As stated previously it can often be difficult to deal with non-responders. Question 13 requires that there is some attempt made to quantify the level of non-response by the researchers and asks the reader to interpret if the response rate is likely to lead to non-response bias. Question 14 is examining if any information on non-responders was available and if so were they comparable to those that did respond as this could help in answering question 13. Nonresponse bias occurs if the non-responders are substantially different to the rest of the population in the sample [15].

Internally Consistent Results

Question 15 is an exploration of the basic data and asks that the reader spends some time exploring the numbers given in the results; in the text, figures and tables. Information about the level of missing data should also be declared in the results. It is important to check that the numbers add up in the tables and the text. If the study has recruited 100 participants, the tables and the text should include data about 100 participants. If not, the missing data should be clearly declared and the reason for its non-appearance explained.

Comprehensive Description of Results

It is important to check that all the methods described previously lead to data in the results section (question 16). Sometimes the results from all analyses are not described. If this is noted it will be unclear whether the researcher found non-significant results or just didn't describe what was found. If there are results missing that you would expect to find, there is a concern that these missing results may not have been what the researcher wanted to see and hence the authors have omitted them. It is also important that the significance level declared in the methods is adhered to. As the reader, it is important to watch out for phrases such as "tended towards significance" in the text, and if these are used to pay close attention to the results.

Discussion

The discussion of a paper should summarise key results of the study objectives. It should give an overall interpretation of the results of the study keeping in mind the limitations and the external validity of the document. The discussion section should also address both significant and nonsignificant findings of the study and make comparisons with other research, citing

their sources [2,4].

Justified Discussions and Conclusions

In question 17 there is an expectation that the researcher gives an overall summary of the main findings of the study and discusses these in detail. It is important that the reader considers the study as a whole when reading the researcher's conclusion. If the researcher's conclusion is different or is more definitive than the study suggests it should be, it can be an indication that the researcher has misunderstood their own study or has other motives or interests for coming to that conclusion. It is up to the reader to explore the discussion fully in order to answer question 17. The following points should be taken into account:

Aim

In the discussion section the researcher should discuss all results that pertain to the overall aim of the study, even if they are not significant. If some results are overlooked in the discussion it could suggest that the researcher either doesn't believe the results, or doesn't want to draw attention to controversial discoveries from the study and may therefore be giving a biased overview of the research conducted.

Selection Bias

There is an expectation that the researcher discusses selection biases and takes these into account when interpreting the results of the study. This also gives a clear view of whether the researcher has an overall understanding of the study design. (See notes on selection bias in the methods section). Non-response Was there an interpretation of the results that included nonresponse? This is particularly important if the response rate was low, as non-responders may be a specific group, and lead to a shift in the baseline data (See notes on nonresponse in the methods section).

Confounding

Confounding is a major threat to the validity of practical inferences made from statistical analyses about cause and effect. Confounding occurs when the outcome of interest is associated with two different independent variables and one of those variables is closely associated with the outcome only because it is closely associated with the other variable (confounder). This can sometimes be accounted for using statistical methods however sometimes these associations are missed because the confounder isn't measured or isn't considered to be a confounder in the analyses. What then happens is an erroneous conclusion is made; that the variable might have a causal relationship with the outcome. The researcher should consider confounding both in the analyses and in the interpretation of the results [18]. An example would be where in a study on cancer a researcher concludes that increased alcohol intake causes lung cancer; however there was confounding in the sample that the researcher didn't discover. People in the study that were inclined to drink more alcohol were also inclined to smoke more (the confounder) and smoking was the cause of lung cancer not increased alcohol intake. Similarly, a study was undertaken to examine surgical deaths in cats. The researcher concluded that cats that had gaseous anaesthesia were more likely to die during surgery than those that had just injectable anaesthesia. There was confounding in the

sample: cats that underwent surgery using gaseous anaesthesia were more likely to be ill or undergoing major surgical procedures (the confounders) and this was the cause for cats being more likely to die during surgery and not the use of gaseous anaesthetics.

Non-significant Results

Discussing non-significant results is as important as discussing significant results and should also be included in the discussion, especially if they have a direct association with the aim being investigated. Non-significant results can be influenced by factors associated with study design and sample size. If there are biases introduced during the study design this can lead to non-significant results that in reality may be significant (this can work the other way around as well). If there are only small differences between groups, non-significant results may be apparent because the sample size is too small (see sample size justification). Again it is important that the researcher has a clear understanding of this and conveys that in the discussion.

Limitations

In question 18 we explore whether limitations are discussed. Unfortunately all forms of research have some limitations. The question here is whether the researcher has an understanding of the limitations involved in their study design. If this issue is not explored, this is cause for concern that the limitations don't stop at the design and that the researcher has a poor understanding of the study as a whole.

Other Conflicts of Interest

It is very important that conflicts of interest or bodies involved in funding the study are declared in the text (question 19). This can give an impression as to background reasons for carrying out the study. Where studies are funded by a specific agency the researcher may unconsciously interpret in favour of the agencies' ideals; if the researcher has worked in a specific area their own ideas and beliefs may affect the interpretation of the results. It is up to the reader to identify these and come to the conclusion as to whether these conflicts of interest are relevant or not. This can be declared in different areas of the text and should be stated.

Ethical Approval

Question 20 deals with ethical approval and participant consent. It is important that these are sought before carrying out research on any animal or person.

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Appendix G. Critical Appraisal Skills Programme (CASP) checklist

CASP Checklist: 12 questions to help you make sense of a **Cohort Study**.

How to use this appraisal tool: Three broad issues need to be considered when appraising a cohort study:

Are the results of the study valid? (Section A)

What are the results? (Section B)

Will the results help locally? (Section C).

The 12 questions on the following pages are designed to help you think about these issues systematically. The first two questions are screening questions and can be answered quickly. If the answer to both is “yes”, it is worth proceeding with the remaining questions. There is some degree of overlap between the questions, you are asked to record a “yes”, “no” or “can’t tell” to most of the questions. A number of italicised prompts are given after each question. These are designed to remind you why the question is important. Record your reasons for your answers in the spaces provided.

About: These checklists were designed to be used as educational pedagogic tools, as part of a workshop setting, therefore we do not suggest a scoring system. The core CASP checklists (randomised controlled trial & systematic review) were based on JAMA 'Users’ guides to the medical literature 1994 (adapted from Guyatt GH, Sackett DL, and Cook DJ), and piloted with health care practitioners. For each new checklist, a group of experts were assembled to develop and pilot the checklist and the workshop format with which it would be used. Over the years overall adjustments have been made to the format, but a recent survey of checklist users reiterated that the basic format continues to be useful and appropriate.

Referencing: we recommend using the Harvard style citation, i.e.: Critical Appraisal Skills Programme (2018). CASP (insert name of checklist i.e. Cohort Study) Checklist. [online] Available at: URL. Accessed: Date Accessed.

Paper for appraisal and reference:.....

Section A: Are the results of the study valid?		
1. Did the study address a clearly focused issue?	Yes ☐ Can't Tell ☐ No ☐	HINT: A question can be 'focused' in terms of • the population studied • the risk factors studied • is it clear whether the study tried to detect a beneficial or harmful effect • the outcomes considered
Comments:		
2. Was the cohort recruited in an acceptable way?	Yes ☐ Can't Tell ☐ No ☐	HINT: Look for selection bias which might compromise the generalisability of the findings: • was the cohort representative of a defined population • was there something special about the cohort • was everybody included who should have been
Comments:		
Is it worth continuing?		

3. Was the exposure accurately measured to minimise bias?

Yes ☐
Can't Tell ☐
No ☐

HINT: Look for measurement or classification bias:
- did they use subjective or objective measurements
- do the measurements truly reflect what you want them to (have they been validated)
- were all the subjects classified into exposure groups using the same procedure

Comments:

4. Was the outcome accurately measured to minimise bias?

Yes ☐
Can't Tell ☐
No ☐

HINT: Look for measurement or classification bias:
- did they use subjective or objective measurements
- do the measurements truly reflect what you want them to (have they been validated)
- has a reliable system been established for detecting all the cases (for measuring disease occurrence)
- were the measurement methods similar in the different groups
- were the subjects and/or the outcome assessor blinded to exposure (does this matter)

Comments:

5. (a) Have the authors identified all important confounding factors?

Yes ☐
Can't Tell ☐
No ☐

HINT:
- list the ones you think might be important, and ones the author missed

Comments:

5. (b) Have they taken account of the confounding factors in the design and/or analysis?

Yes ☐
Can't Tell ☐
No ☐

HINT:
- look for restriction in design, and techniques e.g. modelling, stratified-, regression-, or sensitivity analysis to correct, control or adjust for confounding factors

Comments:

6. (a) Was the follow up of subjects complete enough?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- the good or bad effects should have had long enough to reveal themselves
- the persons that are lost to follow-up may have different outcomes than those available for assessment
- in an open or dynamic cohort, was there anything special about the outcome of the people leaving, or the exposure of the people entering the cohort

6. (b) Was the follow up of subjects long enough?

Yes ☐
Can't Tell ☐
No ☐

Comments:

Section B: What are the results?

7. What are the results of this study?

HINT: Consider
- what are the bottom line results
- have they reported the rate or the proportion between the exposed/unexposed, the ratio/rate difference
- how strong is the association between exposure and outcome (RR)
- what is the absolute risk reduction (ARR)

Comments:

8. How precise are the results?

HINT:
- look for the range of the confidence intervals, if given

Comments:	

9. Do you believe the results?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- big effect is hard to ignore
- can it be due to bias, chance or confounding
- are the design and methods of this study sufficiently flawed to make the results unreliable
- Bradford Hills criteria (e.g. time sequence, dose-response gradient, biological plausibility, consistency)

Comments:	

Section C: Will the results help locally?

10. Can the results be applied to the local population?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider whether
- a cohort study was the appropriate method to answer this question
- the subjects covered in this study could be sufficiently different from your population to cause concern
- your local setting is likely to differ much from that of the study
- you can quantify the local benefits and harms

Comments:	

11. Do the results of this study fit with other available evidence?

Yes ☐
Can't Tell ☐
No ☐

Comments:

12. What are the implications of this study for practice?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- one observational study rarely provides sufficiently robust evidence to recommend changes to clinical practice or within health policy decision making
- for certain questions, observational studies provide the only evidence
- recommendations from observational studies are always stronger when supported by other evidence

Comments:

Appendix H. AXIS Risk of Bias Assessment Table

	Benítez Camacho et al., (2010)	Marissen et al., (2012)	Ritter et al., (2011)	Soderstrom et al., (2005)	Strunz et al., (2015)	Schulze et al., (2013)
Introduction						
1.Were the aims/objectives of the study clear?	Yes	Yes	Yes	Yes	Yes	Yes
Methods						
2. Was the study design appropriate for the stated aim(s)?	Yes	Yes	Yes	Yes	Yes	Yes
3. Was the sample size justified?	No	No	No	No	No	No
4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	Yes	Yes	Yes	Yes	Yes	Yes
5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	No	Yes	Yes	Yes	Yes	Yes
6.Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	Yes	Yes	Yes	Yes	Yes	Yes
7.Were measures undertaken to address and categorise non-responders?	No	No	No	No	No	No
8.Were the risk factor and outcome variables measured appropriate to the aims of the study?	Yes	Yes	Yes	Yes	Yes	Yes
9.Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	Yes	Yes	Yes	Yes	Yes	Yes

10.Is it clear what was used to determined statistical significance and/or precision estimates? (e.g. p-values, confidence intervals)	Yes	Yes	Yes	Yes	Yes	Yes
11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	Yes	†Yes/No	Yes	Yes	Yes	Yes
Results						
12. Were the basic data adequately described?	†Yes/No	Yes	Yes	†Yes/No	Yes	Yes
13. Does the response rate raise concerns about non-response bias?	No	No	Yes	Yes	No	Yes
14. If appropriate, was information about non-responders described?	No	No	No	Yes	No	Yes
15. Were the results internally consistent?	No	Yes	Yes	No	Yes	Yes
16. Were the results presented for all the analyses described in the methods?	Yes	Yes	Yes	Yes	Yes	Yes
Discussion						
17. Were the authors' discussions and conclusions justified by the results?	No	Yes	Yes	No	Yes	No
18. Were the limitations of the study discussed?	No	No	Yes	Yes	Yes	Yes
Others						
19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?	No	No	No	No	No	No
20. Was ethical approval or consent of participants attained?	Yes	Yes	Yes	Yes	Yes	Yes

Note: Possible answers: Yes / No / Do not know/comment. †Refers to disagreement with the two raters.

Appendix I. CASP Cohort Study Checklist Table

Perry and Perry (2004)		
(Section A) **Are the results of the study valid?**		
	Rater 1	*Rater 2*
1.Did the study address a clearly focused issue?	Yes	Yes
2. Was the cohort recruited in an acceptable way?	Yes	Yes
3. Was the exposure accurately measured to minimise bias?	Yes	Yes
4. Was the outcome accurately measured to minimise bias?	Yes	Yes
5a. Have the authors identified all important confounding factors?	Yes	Yes
5b. Have they taken account of the confounding factors in the design and/or analysis?	Yes	Yes
6.(a) Was the follow up of subjects complete enough?	No	No
6. (b) Was the follow up of subjects long enough?	Yes	Yes
(Section B) **What are the results?**		
7. What are the results of this study?	No	No
8. How precise are the results?	Yes	Yes
9. Do you believe the results?	No	No
(Section C) **Will the results help locally?**		
10. Can the results be applied to the local population?	No	No

11. Do the results of this study fit with other available evidence?	Yes	Yes
12. What are the implications of this study for practice?	No	No

Options to choose: Yes, No, or Don’t Know.

Appendix J. SR and MA reasons for exclusion

Study	Title	Reasons for Exclusion
Adachi, (2004)	The metaphor and sarcasm scenario test: a new instrument to help differentiate high functioning pervasive developmental disorder from attention deficit/hyperactivity disorder	Children in sample
Abdi, (2004)	Social cognition and its neural correlates in schizophrenia and autism	Review
Ackerman, (2018)	Language, Theory of Mind and Autism Therapy	Review
Caine et al. (2021)	The Impact of a Novel Mimicry Task for Increasing Emotion Recognition in Adults with Autism Spectrum Disorder and Alexithymia: Protocol for a Randomized Controlled Trial	Unpublished
Ciaramelli, (2013)	Individualized theory of mind (iToM): when memory modulates empathy	No ASD sample
Channon et al. (2014)	Mentalising and social problem-solving in adults with Asperger's syndrome	No intervention
Chien, (2020)	The effectiveness of the program for the education and enrichment of relational skills (PEERS) social training program in Taiwanese young adults with Autism Spectrum Disorder.	No intervention
Chen et al. (2022)	Exploring interpersonal and environmental factors of autistic adolescents' peer engagement in integrated education	No ASD sample
David et al. (2010)	Investigation of mentalizing and visuospatial perspective taking for self and other in Asperger syndrome	No intervention
Enticott et al. (2016)	A clinical trial of repetitive transcranial magnetic stimulation (rTMS) for improving social relating in adolescents and young adults with autism spectrum disorder (ASD)	Medical intervention
Feyerabend, (2018)	Theory of mind in remitted bipolar disorder: Younger patients struggle in tasks of higher ecological validity	No ASD sample
Frolli et al. (2020)	Emotional Education in Early Onset Schizophrenia and Asperger's Syndrome	Children in sample
Gleichgerrcht et al. (2013)	Selective impairment of cognitive empathy for moral judgment in adults with high functioning autism	Not an intervention
Hagenmuller et al. (2014)	Empathic resonance in Asperger syndrome	Medical intervention
Hand et al. (2023)	Emoji Identification and Emoji Effects on Sentence Emotionality in ASD-Diagnosed Adults and Neurotypical Controls	No intervention

Isrctn, (2017)	Therapeutic group for women on the autism spectrum	Unpublished
Javed and Park, (2019)	Interactions With an Empathetic Agent: Regulating Emotions and Improving Engagement in Autism	No intervention
Kuzmanovic et al. (2011)	A matter of words: Impact of verbal and nonverbal information on impression formation in high-functioning autism	No intervention
Kazemi and Abolghasemi, (2019)	Effectiveness of play-based empathy training on social skills in students with Autistic Spectrum Disorders	Children in sample
López-Pérez et al. (2017)	Interpersonal emotion regulation in Asperger's syndrome and borderline personality disorder	No intervention
Levin et al. (2015)	Extending decision making competence to special populations: a pilot study of persons on the autism spectrum	No intervention
Ma et al. (2023)	Examining the Effects of Theory of Mind and Social Skills Training on Social Competence in Adolescents with Autism	No intervention
Malcolm, (2018)	'It just opens up their world': autism, empathy, and the therapeutic effects of equine interactions	No intervention
McDonald et al. (2022)	Performance- and Theater-Based Interventions for Supporting Social Cognition and Social Communication in Autistic Youth: A Review and Theoretical Synthesis	Children in sample
Mastrominico et al. (2018)	Effects of Dance Movement Therapy on Adult Patients with Autism Spectrum Disorder: A Randomized Controlled Trial	Children in sample
Mesibov and Stephens (1990)	Perceptions of popularity among a group of high-functioning adults with autism	Children in sample
Mul et al. (2018)	The Feeling of Me Feeling for You: Interoception, Alexithymia and Empathy in Autism	No intervention
Moret-Tatay et al. (2023)	The Relationship between Face Processing, Cognitive and Affective Empathy	No ASD sample
M Lu et al. (2023)	Struggling to appear normal': a moderated mediational analysis of empathy and camouflaging in the association between autistic traits and depressive symptoms	No intervention
Skorich et al. (2017)	Exploring the Cognitive Foundations of the Shared Attention Mechanism: Evidence for a	No intervention

	Relationship Between Self-Categorization and Shared Attention Across the Autism Spectrum	
Silarat, (2022)	Piano Lessons: Fostering Theory of Mind in ASD Through Imitation	No intervention
Simpraga et al. (2021)	Adults with autism spectrum disorder show atypical patterns of thoughts and feelings during rest	No intervention
Strunz, (2017)	Romantic relationships and relationship satisfaction among adults with Asperger syndrome and high-functioning autism	No intervention
Sasson, (2020)	Social cognition as a predictor of functional and social skills in autistic adults without intellectual disability	No intervention
Tahazadeh et al. (2021)	Mind reading in films task to assess social cognitive deficits in autism spectrum conditions	No intervention
Takata et al. (2023)	Social skills training using multiple humanoid robots for individuals with autism spectrum conditions	Children in sample
Tabullo et al. (2018)	Associations between Fiction Reading, Trait Empathy and Theory of Mind Ability	No ASD sample
Quinde-Zlibut et al. (2022)	Identifying and describing subtypes of spontaneous empathic facial expression production in autistic adults	No intervention
Wagels et al. (2020)	Autism and Reactions to Provocation in a Social and Non-social Context	No intervention
Zinck et al. (2021)	Knowing me, knowing you: Spontaneous use of mentalistic language for self and other in autism	Does not meet research criteria
Zhao et al. (2018)	Autistic Traits and Prosocial Behaviour in the General Population: Test of the Mediating Effects of Trait Empathy and State Empathic Concern	No ASD sample

Appendix K. The ROB-2 Quality Assessment Tool.

Revised Cochrane risk-of-bias tool for randomized trials (RoB 2)

TEMPLATE FOR COMPLETION

Edited by Julian PT Higgins, Jelena Savović, Matthew J Page, Jonathan AC Sterne
on behalf of the RoB2 Development Group

Version of 22 August 2019

The development of the RoB 2 tool was supported by the MRC Network of Hubs for Trials Methodology Research (MR/L004933/2- N61), with the support of the host MRC ConDuCT-II Hub (Collaboration and innovation for Difficult and Complex randomised controlled Trials In Invasive procedures - MR/K025643/1), by MRC research grant MR/M025209/1, and by a grant from The Cochrane Collaboration.

Study details

Reference	

Study design

X Individually-randomized parallel-group trial

☐ Cluster-randomized parallel-group trial

☐ Individually randomized cross-over (or other matched) trial

For the purposes of this assessment, the interventions being compared are defined as

Experimental: | Comparator:

Specify which outcome is being assessed for risk of bias

Specify the numerical result being assessed. In case of multiple alternative analyses being presented, specify the numeric result (e.g. RR = 1.52 (95% CI 0.83 to 2.77) and/or a reference (e.g. to a table, figure or paragraph) that uniquely defines the result being assessed.

Is the review team's aim for this result…?

☐ to assess the effect of *assignment to intervention* (the 'intention-to-treat' effect)

☐ to assess the effect of *adhering to intervention* (the 'per-protocol' effect)

If the aim is to assess the effect of *adhering to intervention*, select the deviations from intended intervention that should be addressed (at least one must be checked):

☐ occurrence of non-protocol interventions

☐ failures in implementing the intervention that could have affected the outcome

☐ non-adherence to their assigned intervention by trial participants

Which of the following sources were <u>obtained</u> to help inform the risk-of-bias assessment? (tick as many as apply)

☐ Journal article(s) with results of the trial

☐ Trial protocol

☐ Statistical analysis plan (SAP)

☐ Non-commercial trial registry record (e.g. ClinicalTrials.gov record)

☐ Company-owned trial registry record (e.g. GSK Clinical Study Register record)

☐ "Grey literature" (e.g. unpublished thesis)

☐ Conference abstract(s) about the trial

☐ Regulatory document (e.g. Clinical Study Report, Drug Approval Package)

☐ Research ethics application

☐ Grant database summary (e.g. NIH RePORTER or Research Councils UK Gateway to Research)

☐	Personal communication with trialist
☐	Personal communication with the sponsor

Risk of bias assessment

Responses underlined in green are potential markers for low risk of bias, and responses in red are potential markers for a risk of bias. Where questions relate only to sign posts to other questions, no formatting is used.

Domain 1: Risk of bias arising from the randomization process

Signalling questions	Comments	Response options
1.1 Was the allocation sequence random?		Y / PY / PN / N / NI
1.2 Was the allocation sequence concealed until participants were enrolled and assigned to interventions?		Y / PY / PN / N / NI
1.3 Did baseline differences between intervention groups suggest a problem with the randomization process?		Y / PY / PN / N / NI
Risk-of-bias judgement		Low / High / Some concerns
Optional: What is the predicted direction of bias arising from the randomization process?		NA / Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Domain 2: Risk of bias due to deviations from the intended interventions (*effect of assignment to intervention*)

Signalling questions	Comments	Response options
2.1. Were participants aware of their assigned intervention during the trial?		Y / PY / PN / N / NI
2.2. Were carers and people delivering the interventions aware of participants' assigned intervention during the trial?		Y / PY / PN / N / NI
2.3. If Y/PY/NI to 2.1 or 2.2: Were there deviations from the intended intervention that arose because of the trial context?		NA / Y / PY / PN / N / NI
2.4 If Y/PY to 2.3: Were these deviations likely to have affected the outcome?		NA / Y / PY / PN / N / NI
2.5. If Y/PY/NI to 2.4: Were these deviations from intended intervention balanced between groups?		NA / Y / PY / PN / N / NI
2.6 Was an appropriate analysis used to estimate the effect of assignment to intervention?		Y / PY / PN / N / NI
2.7 If N/PN/NI to 2.6: Was there potential for a substantial impact (on the result) of the failure to analyse participants in the group to which they were randomized?		NA / Y / PY / PN / N / NI
Risk-of-bias judgement		Low / High / Some concerns
Optional: What is the predicted direction of bias due to deviations from intended interventions?		NA / Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Domain 2: Risk of bias due to deviations from the intended interventions (*effect of adhering to intervention*)

Signalling questions	Comments	Response options
2.1. Were participants aware of their assigned intervention during the trial?		Y / PY / PN / N / NI
2.2. Were carers and people delivering the interventions aware of participants' assigned intervention during the trial?		Y / PY / PN / N / NI
2.3. [If applicable:] If Y/PY/NI to 2.1 or 2.2: Were important non-protocol interventions balanced across intervention groups?		NA / Y / PY / PN / N / NI
2.4. [If applicable:] Were there failures in implementing the intervention that could have affected the outcome?		NA / Y / PY / PN / N / NI
2.5. [If applicable:] Was there non-adherence to the assigned intervention regimen that could have affected participants' outcomes?		NA / Y / PY / PN / N / NI
2.6. If N/PN/NI to 2.3, or Y/PY/NI to 2.4 or 2.5: Was an appropriate analysis used to estimate the effect of adhering to the intervention?		NA / Y / PY / PN / N / NI
Risk-of-bias judgement		Low / High / Some concerns
Optional: What is the predicted direction of bias due to deviations from intended interventions?		NA / Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Domain 3: Missing outcome data

Signalling questions	Comments	Response options
3.1 Were data for this outcome available for all, or nearly all, participants randomized?		Y / PY / PN / N / NI
3.2 If N/PN/NI to 3.1: Is there evidence that the result was not biased by missing outcome data?		NA / Y / PY / PN / N
3.3 If N/PN to 3.2: Could missingness in the outcome depend on its true value?		NA / Y / PY / PN / N / NI
3.4 If Y/PY/NI to 3.3: Is it likely that missingness in the outcome depended on its true value?		NA / Y / PY / PN / N / NI
Risk-of-bias judgement		Low / High / Some concerns
Optional: What is the predicted direction of bias due to missing outcome data?		NA / Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Domain 4: Risk of bias in measurement of the outcome

Signalling questions	Comments	Response options
4.1 Was the method of measuring the outcome inappropriate?		Y / PY / PN / N / NI
4.2 Could measurement or ascertainment of the outcome have differed between intervention groups?		Y / PY / PN / N / NI
4.3 If N/PN/NI to 4.1 and 4.2: Were outcome assessors aware of the intervention received by study participants?		NA / Y / PY / PN / N / NI
4.4 If Y/PY/NI to 4.3: Could assessment of the outcome have been influenced by knowledge of intervention received?		NA / Y / PY / PN / N / NI
4.5 If Y/PY/NI to 4.4: Is it likely that assessment of the outcome was influenced by knowledge of intervention received?		NA / Y / PY / PN / N / NI
Risk-of-bias judgement		Low / High / Some concerns
Optional: What is the predicted direction of bias in measurement of the outcome?		NA / Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Domain 5: Risk of bias in selection of the reported result

Signalling questions	Comments	Response options
5.1 Were the data that produced this result analysed in accordance with a pre-specified analysis plan that was finalized before unblinded outcome data were available for analysis?		Y / PY / PN / N / NI
Is the numerical result being assessed likely to have been selected, on the basis of the results, from...		
5.2. ... multiple eligible outcome measurements (e.g. scales, definitions, time points) within the outcome domain?		Y / PY / PN / N / NI
5.3 ... multiple eligible analyses of the data?		Y / PY / PN / N / NI
Risk-of-bias judgement		Low / High / Some concerns
Optional: What is the predicted direction of bias due to selection of the reported result?		NA / Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Overall risk of bias

Risk-of-bias judgement		Low / High / Some concerns
Optional: What is the overall predicted direction of bias for this outcome?		NA / Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Appendix L. ROBINS-I Quality Assessment Tool

The Risk Of Bias In Non-randomized Studies – of Interventions (ROBINS-I) assessment tool

(version for cohort-type studies)

Version 19 September 2016

ROBINS-I tool (Stage I): At protocol stage

Specify the review question

Participants	
Experimental intervention	
Comparator	
Outcomes	

List the confounding domains relevant to all or most studies

List co-interventions that could be different between intervention groups and that could impact on outcomes

ROBINS-I tool (Stage II): For each study

Specify a target randomized trial specific to the study

Design	Individually randomized / Cluster randomized / Matched (e.g. cross-over)
Participants	
Experimental intervention	
Comparator	

Is your aim for this study…?

☐ to assess the effect of *assignment to* intervention
☐ to assess the effect of *starting and adhering to* intervention

Specify the outcome

Specify which outcome is being assessed for risk of bias (typically from among those earmarked for the Summary of Findings table). Specify whether this is a proposed benefit or harm of intervention.

Specify the numerical result being assessed

In case of multiple alternative analyses being presented, specify the numeric result (e.g. RR = 1.52 (95% CI 0.83 to 2.77) and/or a reference (e.g. to a table, figure or paragraph) that uniquely defines the result being assessed.

Preliminary consideration of confounders

Complete a row for each important confounding domain (i) listed in the review protocol; and (ii) relevant to the setting of this particular study, or which the study authors identified as potentially important.

"Important" confounding domains are those for which, in the context of this study, adjustment is expected to lead to a clinically important change in the estimated effect of the intervention. "Validity" refers to whether the confounding variable or variables fully measure the domain, while "reliability" refers to the precision of the measurement (more measurement error means less reliability).

(i) Confounding domains listed in the review protocol				
Confounding domain	Measured variable(s)	Is there evidence that controlling for this variable was unnecessary?*	Is the confounding domain measured validly and reliably by this variable (or these variables)?	OPTIONAL: Is failure to adjust for this variable (alone) expected to favour the experimental intervention or the comparator?
			Yes / No / No information	Favour experimental / Favour comparator / No information

(ii) Additional confounding domains relevant to the setting of this particular study, or which the study authors identified as important				
Confounding domain	Measured variable(s)	Is there evidence that controlling for this variable was unnecessary?*	Is the confounding domain measured validly and reliably by this variable (or these variables)?	OPTIONAL: Is failure to adjust for this variable (alone) expected to favour the experimental intervention or the comparator?
			Yes / No / No information	Favour experimental / Favour comparator / No information

* In the context of a particular study, variables can be demonstrated not to be confounders and so not included in the analysis: (a) if they are not predictive of the outcome; (b) if they are not predictive of intervention; or (c) because adjustment makes no or minimal difference to the estimated effect of the primary parameter. Note that “no statistically significant association” is not the same as “not predictive”.

Preliminary consideration of co-interventions

Complete a row for each important co-intervention (i) listed in the review protocol; and (ii) relevant to the setting of this particular study, or which the study authors identified as important.

"Important" co-interventions are those for which, in the context of this study, adjustment is expected to lead to a clinically important change in the estimated effect of the intervention.

(i) Co-interventions listed in the review protocol		
Co-intervention	Is there evidence that controlling for this co-intervention was unnecessary (e.g. because it was not administered)?	Is presence of this co-intervention likely to favour outcomes in the experimental intervention or the comparator
		Favour experimental / Favour comparator / No information
		Favour experimental / Favour comparator / No information
		Favour experimental / Favour comparator / No information
		Favour experimental / Favour comparator / No information

(ii) Additional co-interventions relevant to the setting of this particular study, or which the study authors identified as important		
Co-intervention	Is there evidence that controlling for this co-intervention was unnecessary (e.g. because it was not administered)?	Is presence of this co-intervention likely to favour outcomes in the experimental intervention or the comparator
		Favour experimental / Favour comparator / No information
		Favour experimental / Favour comparator / No information

		Favour experimental / Favour comparator / No information
		Favour experimental / Favour comparator / No information

Risk of bias assessment

Responses underlined in green are potential markers for low risk of bias, and responses in red are potential markers for a risk of bias. Where questions relate only to sign posts to other questions, no formatting is used.

Signalling questions	Description	Response options
Bias due to confounding		
1.1 Is there potential for confounding of the effect of intervention in this study? **If N/PN to 1.1:** the study can be considered to be at low risk of bias due to confounding and no further signalling questions need be considered		Y / PY / PN / N
If Y/PY to 1.1: determine whether there is a need to assess time-varying confounding:		
1.2. Was the analysis based on splitting participants' follow up time according to intervention received? **If N/PN**, answer questions relating to baseline confounding (1.4 to 1.6) **If Y/PY**, go to question 1.3.		NA / Y / PY / PN / N / NI

1.3. Were intervention discontinuations or switches likely to be related to factors that are prognostic for the outcome? **If N/PN**, answer questions relating to baseline confounding (1.4 to 1.6) **If Y/PY**, answer questions relating to both baseline and time-varying confounding (1.7 and 1.8)		NA / Y / PY / PN / N / NI
Questions relating to baseline confounding only		
1.4. Did the authors use an appropriate analysis method that controlled for all the important confounding domains?		NA / Y / PY / PN / N / NI
1.5. **If Y/PY to 1.4**: Were confounding domains that were controlled for measured validly and reliably by the variables available in this study?		NA / Y / PY / PN / N / NI
1.6. Did the authors control for any post-intervention variables that could have been affected by the intervention?		NA / Y / PY / PN / N / NI
Questions relating to baseline and time-varying confounding		
1.7. Did the authors use an appropriate analysis method that controlled for all the important confounding domains and for time-varying confounding?		NA / Y / PY / PN / N / NI
1.8. **If Y/PY to 1.7**: Were confounding domains that were controlled for measured validly and reliably by the variables available in this study?		NA / Y / PY / PN / N / NI
Risk of bias judgement		Low / Moderate / Serious / Critical / NI

Optional: What is the predicted direction of bias due to confounding?		Favours experimental / Favours comparator / Unpredictable

Bias in selection of participants into the study		
2.1. Was selection of participants into the study (or into the analysis) based on participant characteristics observed after the start of intervention? **If N/PN to 2.1:** go to 2.4		Y / PY / PN / N / NI
2.2. **If Y/PY to 2.1**: Were the post-intervention variables that influenced selection likely to be associated with intervention?		NA / Y / PY / PN / N / NI
2.3 **If Y/PY to 2.2**: Were the post-intervention variables that influenced selection likely to be influenced by the outcome or a cause of the outcome?		NA / Y / PY / PN / N / NI
2.4. Do start of follow-up and start of intervention coincide for most participants?		Y / PY / PN / N / NI
2.5. **If Y/PY to 2.2 and 2.3, or N/PN to 2.4**: Were adjustment techniques used that are likely to correct for the presence of selection biases?		NA / Y / PY / PN / N / NI
Risk of bias judgement		Low / Moderate / Serious / Critical / NI
Optional: What is the predicted direction of bias due to selection of participants into the study?		Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Bias in classification of interventions

3.1 Were intervention groups clearly defined?		Y / PY / PN / N / NI
3.2 Was the information used to define intervention groups recorded at the start of the intervention?		Y / PY / PN / N / NI
3.3 Could classification of intervention status have been affected by knowledge of the outcome or risk of the outcome?		Y / PY / PN / N / NI
Risk of bias judgement		Low / Moderate / Serious / Critical / NI
Optional: What is the predicted direction of bias due to classification of interventions?		Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Bias due to deviations from intended interventions		
If your aim for this study is to assess the effect of assignment to intervention, answer questions 4.1 and 4.2		
4.1. Were there deviations from the intended intervention beyond what would be expected in usual practice?		Y / PY / PN / N / NI
4.2. **If Y/PY to 4.1**: Were these deviations from intended intervention unbalanced between groups *and* likely to have affected the outcome?		NA / Y / PY / PN / N / NI
If your aim for this study is to assess the effect of starting and adhering to intervention, answer questions 4.3 to 4.6		
4.3. Were important co-interventions balanced across intervention groups?		Y / PY / PN / N / NI
4.4. Was the intervention implemented successfully for most participants?		Y / PY / PN / N / NI
4.5. Did study participants adhere to the assigned intervention regimen?		Y / PY / PN / N / NI

4.6. **If N/PN to 4.3, 4.4 or 4.5**: Was an appropriate analysis used to estimate the effect of starting and adhering to the intervention?		NA / Y / PY / PN / N / NI
Risk of bias judgement		Low / Moderate / Serious / Critical / NI
Optional: What is the predicted direction of bias due to deviations from the intended interventions?		Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Bias due to missing data		
5.1 Were outcome data available for all, or nearly all, participants?		Y / PY / PN / N / NI
5.2 Were participants excluded due to missing data on intervention status?		Y / PY / PN / N / NI
5.3 Were participants excluded due to missing data on other variables needed for the analysis?		Y / PY / PN / N / NI
5.4 **If PN/N to 5.1, or Y/PY to 5.2 or 5.3**: Are the proportion of participants and reasons for missing data similar across interventions?		NA / Y / PY / PN / N / NI
5.5 **If PN/N to 5.1, or Y/PY to 5.2 or 5.3**: Is there evidence that results were robust to the presence of missing data?		NA / Y / PY / PN / N / NI
Risk of bias judgement		Low / Moderate / Serious / Critical / NI
Optional: What is the predicted direction of bias due to missing data?		Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Bias in measurement of outcomes		
6.1 Could the outcome measure have been influenced by knowledge of the intervention received?		Y / PY / PN / N / NI
6.2 Were outcome assessors aware of the intervention received by study participants?		Y / PY / PN / N / NI
6.3 Were the methods of outcome assessment comparable across intervention groups?		Y / PY / PN / N / NI
6.4 Were any systematic errors in measurement of the outcome related to intervention received?		Y / PY / PN / N / NI
Risk of bias judgement		Low / Moderate / Serious / Critical / NI
Optional: What is the predicted direction of bias due to measurement of outcomes?		Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Bias in selection of the reported result		
Is the reported effect estimate likely to be selected, on the basis of the results, from... 7.1. ... multiple outcome *measurements* within the outcome domain?		Y / PY / PN / N / NI
7.2 ... multiple *analyses* of the intervention-outcome relationship?		Y / PY / PN / N / NI
7.3 ... different *subgroups*?		Y / PY / PN / N / NI

Risk of bias judgement		Low / Moderate / Serious / Critical / NI
Optional: What is the predicted direction of bias due to selection of the reported result?		Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Overall bias		
Risk of bias judgement		Low / Moderate / Serious / Critical / NI
Optional: What is the overall predicted direction of bias for this outcome?		Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Appendix M. Email Correspondence with Authors.

From: [redacted]
Sent: [redacted]
To: atcunningham@lynn.edu <atcunningham@lynn.edu>

Subject: Study Information Request

Dear Dr Cunnigham,

I am a researcher at the University of East Anglia in England. I included your research in our study (The Effects of a Romantic Relationship Treatment Option for Adults With Autism Spectrum Disorder, 2016 7(2) 99-110) but I would like to perform additional analyses based on a more complete set of data and I need more information about your study, please. I am carrying out a meta-analysis with empathy as the outcome.

From your publication, I was able to abstract the pre and post-scores for the Empathy Quotient (EQ).

EQ total 29.06 (10.53) 33.46 (11.00)

But I need your help with the Mean and Standard Deviation for the EQ scores for the between-groups analysis between RE and RE ASD, please.

I understand that I am requesting a lot of information and that you may not have time to complete this. Yet, it would be most helpful, and I would be extremely grateful. I very much appreciate any assistance you could give with this matter. I would be happy to answer any questions you may have regarding this research.

Thank you.

Sincerely,
[redacted] (Trainee Clinical Psychologist)
University of East Anglia