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A Descriptive Study Exploring the Potential Benefits of a Model Train Club Community for Children with Developmental Disabilities

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Abstract

Approximately 1 in 100 individuals in New Zealand are diagnosed with autism spectrum disorder (ASD), facing significant challenges in socialisation and communication. Identifying effective methods to enhance these skills is important, as difficulties can lead to adversity in independent living, employment, and relationships.

Research indicates that utilising items of interest can boost social interaction motivations in autistic individuals. For example, Le Goff's study demonstrated how structured, interest-based activities like LEGO can promote social engagement.

Building on Le Goff's (2004) findings, this study examined opportunities for facilitating social interactions and communication among autistic children through a model train club. A mixed-methods approach was applied, gathering data via observations, caregiver interviews, a volunteer focus group, and case studies. Observational data confirmed instances of social interaction and engagement with trains. Caregiver interviews revealed the club's beneficial impact on their children and their reasons for ongoing involvement. The volunteer focus group expressed dedication to maintaining an inclusive and engaging atmosphere, emphasising the club's social value. Meanwhile, case studies showed that neurodivergent individuals participated in social interactions, joint attention, and engagement with trains within this environment.

The findings indicate that the model train club is a valuable space for neurodivergent children, particularly those with milder autism, to practice and improve their social interaction skills in a supportive setting.

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Introduction

Autism Spectrum Disorder (ASD), referred to here as 'autistic person,' reflects the autism community's preference for identity-first language (Keating et al., 2023). Is a prevalent, with one in every 100 individuals diagnosed (World Health Organization 2023). Is imperative to support the autistic person as early as possible, which involves family support and inclusive community practices. This is part of a naturalistic approach with literature from Sandbank et al. (2020) and Crank et al. (2021) presenting research that has found positive outcomes from this process. In response to the need for better support for autistic people, various initiatives have emerged to assist. Many of these interventions have been designed to align with social norms and focus on improving well-being (Vivanti, 2020). Among these approaches, socially significant interventions often involve parents incorporating their child's primary interests as motivational tools to promote learning, enhancing social relevance and generalisation. Examples of these types of therapies include PEERS, PRT and JASPER, which all have literature that showcase positive outcomes for autistic people (Pacia et al. 2022; Uljarević et al. 2022; Honan et al. 2023). Despite these advancements, the lived experiences of parents raising autistic children often reveal ongoing challenges, including feelings of isolation and a lack of understanding from others. A 2024 article in the New Zealand Herald highlighted this issue, sharing the perspective of someone who has family members who have autism and works in this space to help others. Miss Malneek stated in the interview, "It's hard for parents to find others that understand, as autism isn't visible. People think you've just got a naughty child" (New Zealand Herald, 2024, p.2). The same article reported a Wairarapa-based community initiative to combat isolation and bring neurodivergent people together through a shared interest in LEGO. In addition to providing space for children to socialise through shared interests and activities, the group also offered

parents opportunities to connect with others with similar experiences (New Zealand Herald, 2024). This article reflected the persistent societal barriers surrounding autistic people and proactive efforts by communities to create more inclusive and supportive environments.

Currently, limited government funding is available to support community-based interventions for autistic children. Estimates suggest privately funded supports are prohibitive and beyond the means of the average New Zealand (NZ) family (MoDP & MoE, 2022). In addition, the downstream costs (including non-financial) associated with autism can include (but are not limited to) all forms of social relationships, communication, employment and learning. Developing cost-effective community-based initiatives (similar to the LEGO club) is imperative to supporting autistic children and their families and effectively using the available resources.

This thesis examines the potential benefits of a community model train club (referred to as ‘the club’ throughout) for autistic children and their families from a behaviour analytic perspective. Located in a town on New Zealand's North Island, the club opens to the public every Sunday from 10 a.m. to 2 p.m. A unique feature of the club is its interactive setup, where volunteers encourage children to operate model trains. This study investigates whether this environment is beneficial to the community and has the potential for children to learn and practice vital skills.

Literature review

This literature review will examine several key areas related to autistic people to establish the foundation for exploring the significance of the train club. It will define ASD, discuss its impacts on individuals, and explain the relevance of using an Applied Behaviour Analysis (ABA) framework. Then, it will review ABA principles, including verbal behaviour and their contributions to understanding autistic people, alongside an overview of interventions tailored to different areas of the spectrum. It will also discuss the limited accessibility and necessity of assistance for neurodivergent and Level 1 autistic children, the benefits of play therapy (such as LEGO-based interventions), and the potential reasons why some autistic children gravitate toward trains. Emphasis will be placed on the potential for community spaces to facilitate teaching and practising new skills. These elements inform the exploration of whether the train club can provide a supportive environment for teaching and practising social skills, which is a large challenge for neurodivergent and Level 1 autistic children (Afsharnejad et al., 2020; American Psychiatric Association, 2022).

What is Autism Spectrum Disorder?

ASD is a lifelong developmental disorder (Pisula, 2021). It is characterised by challenges in social and communication abilities, alongside repetitive and narrow interests that hinder significant aspects of functioning (American Psychiatric Association, 2022). Diagnostic features include hyper- and hyposensitivity to sensory stimuli and behavioural inflexibility (DeGuzman et al., 2024). ASD presentations (and associated needs) are sometimes classified into one of three clusters: Level 1, Level 2 and Level 3. Individuals classified as belonging to Level 3 typically require the most support as there is minimal level for independence, and individuals struggle with communication (in any form), safety, and routine. Level 2 requires moderate support with

adapting to changing environments and basic communication skills, and Level 1 still requires some support and would benefit from guidance in social settings and functional skills (Jensen & Spannagel, 2011).

The prevalence rate for ASD is approximately 1 in every 100 people (World Health Organisation, 2023). Recently, more children have been diagnosed with ASD compared to the past (Koegel et al., 2014). Suggested explanations for this are considerable changes and developments in the diagnostic process (Guthrie et al., 2013; Nassar et al., 2009) and increased education for caregivers and teachers about ASD (Durkin et al., 2015).

The diagnostic criteria for ASD using the DSM-V involve two primary domains of concern. The initial domain focuses on challenges in social communication, which involves difficulties in several areas. These include impairments in communication and language skills, such as the ability to use appropriate gestures like pointing and waving. Individuals may struggle to establish reciprocal conversations or emotional exchanges, and they often find it challenging to adjust their behaviour to fit specific social situations. Additional difficulties may include limited facial expressions, reduced eye contact, and a lack of social reciprocity. This can be seen in minimal interactions during play or conversation with peers and infrequent participation in imaginative play (American Psychiatric Association, 2022). The second area is restricted, repetitive behaviour, interests, or activities manifested by at least two of the following: stereotyped or repetitive use of objects and speech, the necessity for routine and resistance to change, highly fixated interests, and adverse responses to certain sounds, textures, and visual stimuli. These symptoms would have manifested in early childhood, resulting in notable impairments in social or other functioning areas, with no alternative diagnosis providing a better explanation. ASD can also present in similar ways to anxiety, attention deficit hyperactivity

disorder (ADHD), oppositional defiant disorder (ODD) and others. It can also be comorbid with these diagnoses as well (American Psychiatric Association, 2022). Qualified clinicians can diagnose ASD as early as 18 months, but the average age for diagnosis is between 3 and 10 years in NZ (Thabrew & Eggleston, 2018).

The developmental trajectory of an autistic person differs from that of a neurotypical individual. A developmental trajectory encompasses the various aspects of a person's growth and change over time, including cognitive, emotional, physical, and social development (Mitchell et al., 2011). These aspects shape a person's behaviours, abilities, and characteristics (Nagin, 1999). Several factors influence developmental trajectories, including genetics, brain development, education, socioeconomic status, culture, and the environment in which a person is raised (López-Romero et al., 2015). While trajectories vary greatly, autistic people typically experience differences or challenges in specific areas, including behaviour, play, social communication, language development, and learning (American Psychiatric Association, 2022). These skills develop at a slower pace for autistic people, and if not assisted in learning these skills at an early age, the gap in the ability to gain skills becomes larger. This informs the rationale for why it would be important to intervene at an early age (Mitchell et al., 2011).

Early signs of ASD include a lack of attention to faces and difficulty with eye contact, which impairs a child's ability to learn through modelling and behaviour shaping. Because autistic children do not respond to feedback conveyed through facial expressions (such as smiles and frowns), parents find difficulty shaping their child's behaviour. This affects the individual's capacity to function in social settings, as they find it challenging to share interests and communicate their wants and needs (Ingersoll et al., 2007; Frye, 2018). These difficulties can lead to what society perceives as problem behaviours due to communication challenges, wherein

both parties fail to comprehend each other's interactions. Problem behaviours encompass self-harm or violence towards others (O'Nions et al., 2020), tantrums, and stereotypy (Jang et al., 2011). Such behaviours can induce stress for the individual and their family, resulting in societal exclusion, such as being unable to attend school (Brede et al., 2017).

To effectively meet the needs of individuals with disabilities, the medical model of fixing people must not be the sole focus. This view identifies individuals as lacking certain abilities, whether cognitive or physical and promotes the need to correct these perceived deficits (Hogan, 2019; Shyman, 2016). Instead, we should embrace an ecological perspective highlighting society's need to adapt to these differences by modifying systems and enhancing accessibility to foster inclusion and a sense of belonging (A. Graber & J. Graber, 2023; Godin et al., 2017). An inclusive environment is crucial for enabling autistic people to lead rewarding lives (Gray et al., 2014; Carter et al., 2013; Zwilling & Levy, 2022). Many autistic people face limited opportunities to develop social skills, which hinders their ability to engage in meaningful conversations and spontaneous interactions, as they often find themselves excluded from environments that facilitate skill practice (Silveira-Zaldivara, 2021). Lastly, research by Venturini & Parsons (2018) found that autistic people find being socially excluded emotionally distressing, highlighting the importance of environmental inclusion.

Additionally, ABA and other disciplines advocate for teaching autistic individuals essential skills that enhance their communication and capabilities (Cooper et al., 2020). These individuals often encounter challenges that hinder their interactions and social integration, resulting in difficulties in forming friendships and securing employment. With appropriate support and guidance, autistic individuals can develop crucial skills to effectively navigate their

communities (Winder et al., 2013). This involves challenges in learning to acquire new skills, as they do not learn through observation (Taylor & DeQuinzio, 2012).

Thabrew and Eggleston (2018) surveyed NZ to understand the benefits and weaknesses of ASD services and how autistic people are supported and diagnosed. The authors concluded that improved access to diagnostic systems and increased availability of respite care and long-term support are needed. Thabrew and Eggleston emphasise the challenge of limited resources in NZ, which poses a problem due to the extensive support required for autistic people (Divan et al., 2021; Searing et al., 2015).

Level One Autism Spectrum Disorder in the Community

Autistic people face social and sensory challenges, making life in a neurotypical world complex (MacLennan et al., 2023; Zwilling & Levy, 2022). Neurotypical individuals inherently understand facial expressions and body language, which assists them in social reciprocity (Schwartz et al., 2021). This emphasises that autistic individuals find it challenging to learn these behaviours and experience difficulty identifying environments that facilitate these learning skills. Standard environments pose complex for autistic people due to glaring lights, loud noises, and accessibility concerns in places such as supermarkets, sports clubs, and hair salons (Robertson & Simmons, 2013). Experiencing a world that feels overwhelming and socially exclusive can impede daily living and skill development (Shyman, 2016; Zwilling & Levy, 2022).

For Level 1 autistic people, social skills represent an extensive struggle, affecting various life aspects (Afsharnejad et al., 2020). Socialisation is essential for building connections, fostering a sense of belonging, and acquiring skills necessary for work, education, and independent living (Shattuck et al., 2018; Walsh et al., 2018). Challenges initiating interactions and displaying interest in others can lead to unmet needs, as individuals might not seek out

information or interactions, further hindering the development of social skills (Kabashi & Kaczmarek, 2017).

Because the symptoms of Level 1 ASD are less severe, individuals may lack understanding from those around them. This misunderstanding often arises from the perception that autistic people can navigate society without assistance despite facing daily challenges (Shattuck et al., 2018; Spain & Blainey, 2015). Early intervention is essential to reduce the cascading effects arising from the challenges faced by autistic people to minimise the learning difficulties gap experienced in typical environments (Winder et al., 2013; Anderson et al., 2018; Mitchell et al., 2011).

Overview of Intervention

Various disciplines contribute to supporting autistic people, including pharmacological, developmental, cognitive, and behavioural psychology interventions (Fein et al., 2021). Evidence-based interventions are paramount for determining appropriate treatment strategies (McGrew et al., 2016; Contreras et al., 2022; Matson, 2017; Politte et al., 2015). Historically, ASD treatment often involved removing individuals from their communities and institutionalising them (Henninger & Taylor, 2013). This approach was rooted in the belief that ASD stemmed from emotionally distant parenting, particularly by mothers, rather than neurological and biological factors (Feliciano et al., 2018).

Evidence-based practice (EBP) was later introduced. EBP emphasises rigorous research and systematic methodologies to ensure that decisions and interventions are scientifically justified and effective (McGrew et al., 2016). At its core, EBP involves an extensive process that involves formulating relevant questions, gathering the best available evidence, critically

evaluating it, and applying the findings in real-world contexts. By bridging the gap between theory and practice, EBP fosters practical and impactful interventions (Contreras et al., 2022).

Some interventions lack sufficient evidence, posing a problem as their effectiveness and social acceptability remain unsubstantiated (Politte et al., 2015). With growing access to the internet, distinguishing between evidence-based and pseudoscience can be challenging for non-practitioners (Matson, 2017). Examples of pseudoscientific interventions include specialised diets that claim behavioural challenges in autistic individuals stem from inadequate personalised nutrition plans (Mandecka & Regulska-Ilow, 2022). This approach is problematic because it implies that dietary modifications and supplements can improve these difficulties without any scientific support for claims (Matson, 2017). Another example of such intervention is hyperbaric oxygen therapy. Research by Jepson et al. (2011) found no behavioural changes from this intervention. Additionally, Podgórska-Bednarz & Perenc (2021) found similar results analysing papers published on this topic between 2015 and 2021. The abundance of resources offering rapid solutions or cures for autistic people is concerning, particularly given the lack of reliable research supporting these interventions (Smith & MacDonald, 2017; Politte et al., 2015). Failing to utilise interventions supported by scientific evidence puts autistic people at risk of harmful treatments. Exposing them to ineffective interventions without assessing their efficacy makes it harder for autistic people to receive appropriate support (Wong et al., 2015). The objective of discussing ABA is to highlight that numerous evidence-based practices are derived from ABA that have been substantiated through extensive research, demonstrating their efficacy in assisting autistic people and teaching them skills to encourage their learning abilities (Baer et al., 1987; Cooper et al., 2020; Carter et al., 2014; Leaf et al., 2021).

What is Applied Behaviour Analysis?

ABA is a scientific discipline dedicated to understanding and modifying behaviour. It is founded on decades of research and is informed by the philosophy of behaviourism. ABA incorporates principles derived from the Experimental Analysis of Behaviour (EAB), which investigates fundamental behavioural processes. ABA applies these principles to enhance socially significant behaviours (Cooper et al., 2020).

At the core of ABA, all behaviours are learned, which elaborates on Thorndike's law of effect, asserting that behaviours followed by positive consequences are more likely to reoccur. In contrast, those followed by adverse outcomes are less likely to reoccur (Thorndike, 1933). Skinner's elaboration on this is the application of operant behaviour principles (Skinner, 1938), which are structured around the ABC model and are as follows: A is the antecedent, which is the event or condition that triggers the behaviour; B is the behaviour that occurs as a response; and C is the consequence or outcome that follows the behaviour. This model posits that all behaviours are learned through interactions with environmental outcomes, aligning ABA with an ecological perspective on understanding and shaping human behaviour (Helton & Alber-Morgan, 2018). The operant model demonstrates how consequences influence and sustain behaviours in particular contexts, thus putting them under stimulus control (Baer et al., 1987).

ABA is guided by a set of core principles that ensure its effectiveness. Interventions must directly address and measure client behaviours, producing observable and measurable changes when applied. ABA is technological, requiring interventions to be clearly described, replicated, and practical, focusing on behaviours that enhance individuals' quality of life (Baer et al., 1987). It also emphasises generalisation, ensuring that behaviour changes are maintained over time and across different contexts (Arnold-Saritepe et al., 2023). These principles make ABA a systematic

and evidence-based approach to understanding and modifying behaviour, with applications that benefit individuals and society (Baer et al., 1987).

A critical component of ABA is understanding a person's reinforcers, interests, and what maintains the behaviour, particularly when helping individuals acquire new skills or change existing behaviours (Skinner, 1938; Baer et al., 1987; Roane et al., 2016; Leaf et al., 2021). To change existing behaviour, one must alter the environment to understand what maintains it; this includes identifying the function of behaviour, whether it is maintained by attention, tangible rewards, or escape from specific situations (Hanley et al., 2003). Reinforcement connects behaviours with their consequences (Buschbacher & Fox, 2003). For example, identifying activities or items that interest a child can increase the likelihood of desired behaviours if done systematically, as they attain something reinforcing as a result of the desired behaviour (Grove, 2016). This is especially relevant for autistic people, who may find events that would typically function as reinforcement for most people, such as praise, a smile, or specific toys, to be non-reinforcing. This is because they have not learnt to interpret these actions as reinforcing, resulting in their not changing behaviour, as there is no desired consequence. Bottini (2018) highlights that challenges in processing social and non-social rewards among autistic individuals necessitate tailoring reinforcement strategies for each person to meet their unique needs.

Applied Behaviour Analysis for Autism Spectrum Disorder

A turning point in ASD treatment came with the work of Lovaas (1987), who demonstrated that autistic people could learn and develop skills through early intensive behavioural intervention (EIBI), which has since become a large evidence-based intervention for autistic people (Reichow et al. 2014; Makrygianni & Reed, 2010). The behavioural conception of ASD is that many of the challenges experienced stem from difficulties in learning critical skills

during early development (Pelaez & Novak, 2024). In contrast to typically developing children, who acquire skills naturally through processes such as imitating others, attending to social cues, and engaging socially (Vivanti, 2023), autistic people often require structured interventions to develop these abilities (Carter et al., 2014). ABA-based interventions aim to teach these foundational skills in a comprehensive and tailored manner to address the specific needs of individuals across the spectrum (Leaf et al., 2021).

For individuals with Level 3 autism who require substantial support, ABA interventions focus on fundamental skills such as basic communication and systematically address all skill difficulties, including teaching simple requests. Daily living skills, such as toileting and eating, alongside safety training to recognise hazards, are also prioritised. Additional priorities include managing severe behaviours, such as replacing self-injurious actions with functionally equivalent alternative behaviours. To teach these skills, intensive, comprehensive programmes are required. Additionally, ABA provides targeted programmes or interventions addressing the specific needs of autistic people, which is beneficial for all levels. Although some are more tailored for those with Levels 1 and 2 autism (Chung et al., 2024).

ABA transitions from one-on-one clinic-based interventions to natural environments to enhance maintenance and generalisation for lasting benefits (Cooper et al., 2022). This transition underscores the flexibility and individualisation of ABA interventions, which are tailored to address an individual's unique strengths, challenges, and goals (Leaf et al., 2021).

The effectiveness of ABA is rooted in the science practitioner model, which uses data collection and analysis to monitor progress and adjust treatment plans as necessary (Dorsey & Harper, 2018). This evidence-based framework allows interventions to be implemented across

diverse settings, including homes, schools, clinics, caregivers and teachers, ensuring that skills are generalised across various contexts (Ingersoll et al., 2020).

However, ABA-based interventions are not without criticism. They can be time-intensive, often requiring over 20 hours of weekly therapy with trained professionals (Bloh & Axelrod, 2008; Reed et al., 2007). This intensity can lead to challenges such as prompt dependency and limited generalisation (Arnold-Saritepe et al., 2023). These concerns are tackled by developing practices that minimise such issues, as it is a science continually searching for new ways to enhance practice (Leaf et al., 2016). Additionally, a meta-analysis by Eldevik (2010) found that intensive intervention for over 30 hours a week for two years was necessary to create reliable gains in intellectual and adaptive skills for autistic children. Despite the high initial investment, cost-benefit analyses have demonstrated that intensive early behavioural interventions can lead to long-term savings by reducing the need for ongoing support and enabling greater independence for some individuals (Cooper et al., 2022; Kornack et al., 2014).

EIBI is an ABA-informed intervention that underscores the importance of early intervention (Makrygianni & Reed, 2010). Designed for children under four, EIBI comprises 20 to 40 hours of therapy each week for a minimum duration of two years. This approach emphasises the development of foundational skills. It adopts a comprehensive methodology to instruct children in competencies, including attending to individuals, accepting reinforcers, and initiating communication, ultimately progressing towards more specific instructional targets (Lovaas, 1987). Methods such as Discrete Trial Training (DTT), which divides tasks into smaller, manageable steps, are vital to the effectiveness of EIBI (Fava & Strauss, 2014; Creem et al., 2023; Lovaas, 1987). EIBI transitions to more naturalistic approaches as individuals progress, ensuring skills are generalised and maintained. A substantial body of research supports

the efficacy of EIBI. A systematic review by Reichow et al. (2014) concluded that adaptive behaviour, intelligence, social skills, communication and language, autism symptoms, and quality of life improved after two years of autistic children receiving EIBI. A more recent meta-analysis by Rodgers et al. (2021) conducted an individual participant data meta-analysis and found that after two years of receiving EIBI, children improved in cognitive ability and everyday life skills compared to alternative treatments. Additionally, research by Paul et al. (2013) found that DTT aided nonverbal children in developing speech, particularly when compared to naturalistic interventions.

Despite its effectiveness, access to intensive programmes such as EIBI can be challenging in NZ, where funding limitations restrict availability (MoDP & MoE, 2022). ABA remains a cornerstone of ASD intervention due to its ability to address diverse needs across the spectrum (Leaf et al., 2016; Rodgers et al., 2021; Reichow et al., 2014). While the most intensive interventions are often reserved for individuals with the highest support needs (Roane et al., 2016), ABA's flexible and individualised approach ensures that all participants benefit from targeted, evidence-based strategies and work towards improving developmental trajectories (Klintwall et al., 2015).

This discussion highlights ABA's foundational principles, adaptability, and evidence of efficacy. It emphasises why ABA is a leading foundation for helping autistic people and demonstrates its potential to empower individuals through lifelong learning and skill development. This thesis will discuss further interventions to teach specific skills that could be more appropriate for varying levels within the spectrum.

Skinner's Contribution to Verbal Behaviour and Understanding Autism Spectrum Disorder

Skinner developed ABA and expanded it to encompass verbal behaviour (VB). His analysis of VB is rooted in the same operant principles of behaviour analysis, providing essential insights into the communication challenges faced by autistic individuals (Skinner, 1957; Johnson et al., 2017; Greer, 2008). The difference between behaviour analysis and VB is that VB operates within a framework where consequences are socially mediated, emphasising the pivotal role of social interactions in shaping communication (Vargas, 2013; Zwilling & Levy, 2022; Gibson et al., 2021). Skinner conceptualised communication and language as subsets of operant behaviour subject to reinforcement, extinction, and punishment principles. This behavioural perspective prioritises the functional analysis of communication, focusing on what a VB achieves (function) rather than its physical appearance (form) (Cooper et al., 2020). Central to this framework is identifying verbal operants, such as mands, which are critical for initiating effective communication by making requests or issuing commands (Johnson et al., 2017; Skinner, 1957; Shafer, 1995).

Core difficulties for autistic children are VB skills, affecting vocal and non-vocal social communication. These challenges hinder the development of foundational and complex social skills, such as interpreting body language, tone of voice, facial expressions, and engaging in joint attention (Fuller & Kaiser, 2020). Nonverbal communication enriches social interactions by conveying additional meaning and complements spoken language. However, autistic people have not intuitively learned these skills, resulting in requiring explicit teaching (Gantman et al., 2012). Difficulties understanding social cues and communication can lead to non-compliant behaviours, often interpreted as deficits in listening skills, such as failing to follow instructions or respond

appropriately, particularly when reinforcement or structured support is lacking (O'Nions et al., 2020).

For individuals with Level 1 autism, VB challenges may manifest as difficulties initiating conversations, interrupting at inappropriate times, or failing to take conversational turns, all impairing meaningful social interactions (Schwartz et al., 2021; Caemmerer & Hajovsky, 2022). Some individuals may not develop vocal VB due to challenges in controlling their speech organs, necessitating alternative communication methods, such as sign language (Koegel et al., 2020). Addressing these challenges requires providing learning opportunities in environments where autistic people feel comfortable and motivated to engage (Carter et al., 2013; Zwilling & Levy, 2022). Creating reinforcing conditions helps foster social interactions and build foundational communication skills for long-term success (Saggers et al., 2019; Milton et al., 2012; Atkinson et al., 2020).

Applied Behaviour Analysis and Developmental Psychology

Because ASD is a developmental disability and developmental trajectory informs the importance of early intervention (Mitchell et al., 2011; Winder et al., 2013; Anderson et al., 2018), integration of developmental psychology is to be expected. A foundational developmental psychologist, Vygotsky, believed that specific skills develop around similar ages, such as talking, walking, and thinking abstractly (Langford, 2005). However, it is recognised that autistic people may not follow a typical progression toward these developmental milestones (Mitchell et al., 2011).

Another commonality between these disciplines is the belief that learning is observable and situated in the environment, influencing people's thinking and language patterns (Alkhudiry, 2022). Additionally, both disciplines emphasise that people learn new skills through imitation

from individuals who are more skilled in a particular area (Pinquart & Dubow, 2017). These fields agree that early interventions and a focus on socialisation are essential for autistic people, as these lay the groundwork for crucial skills and aid in minimising the gap in developmental trajectories (Alkhudiry, 2022; Mitchell et al., 2011; Wetherby et al., 2018).

The Need for Generalisation, Maintenance and Social Validity

Maintenance and generalisation must be addressed for interventions to yield maximum benefit (Arnold-Saritepe et al., 2023). Generalisation can be divided into four types: generalisation across settings (setting generalisation), behaviours (response generalisation), subjects, and time (maintenance) (Arnold-Saritepe et al., 2023). However, Carruthers's (2020) systematic review highlights that studies often define generalisation differently, leaving no universally accepted outline of what behaviours demonstrate successful generalisation. This emphasises the importance of a universal understanding for successful implementation.

Cooper et al. (2020) identified five key strategies to promote generalisation. The first is teaching the full range of desired target behaviours in every relevant environment. While comprehensive, this approach is often impractical due to the large scope of skills and settings involved (Swan et al., 2016). A more feasible strategy is to teach a variety of examples and probe for the emergence of untrained, similar behaviours in novel environments with different people, assessing whether correct responses occur. Another effective method is to make the instructional setting closely resemble the natural environment. For example, if teaching someone to make a bed, the learning setting should include a bed similar in size and setup to the one they will typically use. Additionally, maximising reinforcement in generalised settings, which involves providing rewards outside the training environment or with different people, can strengthen desired behaviours. Mediating generalisation is another technique involving mediating stimuli or

self-monitoring tools to help individuals track progress. Lastly, training to generalise involves explicitly reinforcing new, spontaneously exhibited behaviours, further promoting flexibility and adaption (Cooper et al., 2020). Fostering generalisation reduces the need for ongoing coaching by parents or specialists, which can be time- and resource-intensive (Neely et al., 2016). Moreover, emphasising generalisation enhances the social validity of interventions.

For an intervention to be socially valid, one must follow the three dimensions of social validity. The first is to outline meaningful goals that guide ongoing treatment development and adaptation. All parties should be involved in outlining the goals for treatment (Wolf, 1978). Social validity also requires acceptability, meaning that the methods used are socially acceptable, align with cultural norms and societal values, and are important to the individual and their community. Finally, it ensures that outcomes are satisfactory for all stakeholders, resulting in socially significant behaviour change (Wolf, 1978). This focus on social validity holds practitioners accountable for prioritising the best interests of participants and their families when implementing interventions (Huntington et al., 2023).

Natural Developmental Behavioural Intervention

Naturalistic developmental behavioural intervention (NDBI) is an umbrella term that uses techniques that implement teaching in a child's everyday surroundings. It focuses on the child's interactions with familiar people rather than within a clinical environment with just a therapist (Fuller et al., 2020). NDBI draws on behavioural and developmental psychology principles and has inspired various branches of other interventions (Schreibman et al., 2015).

A key aspect of NDBI is the use of natural reinforcement. For instance, when teaching a child to put on a sweater, the reinforcement comes from experiencing the warmth of the sweater when feeling cold rather than receiving a separate reward (Schreibman et al., 2015). Imitation is

also emphasised, encouraging individuals to engage and initiate interactions (Ingersoll et al., 2007). Furthermore, the context in which the child learns is crucial as it is teaching embedded in activities the child prefers, often through child-adult engagement activities and play-based interventions (Salter et al., 2016; Ingersoll et al., 2007; Sandbank et al., 2020).

NDBI follows behavioural principles using ABC sequences as a foundation for teaching new skills. It is scientifically evaluated by gathering baseline data, implementing interventions, and comparing results to the baseline to assess improvement (Rogers et al., 2019). Research by Tiede and Walton (2019) found that naturalistic interventions have helped improve social engagement skills. Crank et al. (2021) also found similar results from their meta-analysis research. Lastly, a meta-analysis conducted by Sandbank et al. (2020) found that NDBI produced positive effects for autistic children compared to treatment as usual.

The Early Start Denver Model

The Early Start Denver Model (ESDM) is an example of an NDBI-based intervention aimed at addressing social challenges faced by autistic people. This approach emphasises equipping parents with strategies rather than relying heavily on therapists. ESDM is a research-backed behavioural and developmental psychology method tailored for children aged 12 to 48 months, targeting foundational phases of brain development (Fuller et al., 2020; Vismara et al., 2009).

The ESDM programme typically spans 12 weeks, with each week covering a different topic, such as adaptive behaviour, cognition, communication, play, and social skills (Vismara et al., 2009). The coaching sessions involve the parent and child, facilitated by a therapist. During these sessions, the therapist guides the parent in practising desired interactions and provides feedback and improvement tips, resulting in the parents implementing these techniques at home.

Initially, these sessions can be extensive, with training lasting over 20 hours per week, gradually reducing as the child progresses towards target behaviours (Vismara et al., 2009).

The teachings are embedded in daily life, further facilitating generalisation (Bruinsma et al., 2015). An example of how ESDM would be implemented is during a glueing activity. The adult is taught to move the glue stick out of the child's reach, which would encourage the child to mand for it through pointing or any form of communication, which is a core element of VB (Ingersoll et al., 2007).

ESDM covers various topics, including encouraging routines, increasing attention, building motivation, and fostering imitation and joint attention skills (Vivanti & Rogers, 2014). By involving parents in the teaching and learning process, ESDM makes learning more comfortable for the child. Dawson (2010) compared ESDM intervention with community intervention and found an improvement in IQ and adaptive behaviour over the two years this research was conducted. A meta-analysis by Yu et al. (2020) found no significant changes to receptive language, adaptive behaviour, daily living skills, intellectual functioning, restricted and repetitive behaviour, motor function, and cognition. However, significant effects were shown on socialisation, communication, and expressive language. A meta-analysis by Pires et al. (2024) compared ESDM to EIBI and found that both interventions had their benefits, with EIBI improving symptoms of autism and ESDM enhancing intellectual functioning. This research highlights that various intervention types are valuable for different autistic people, depending on their difficulties. The purpose of discussing ESDM is to highlight a range of interventions for children in the early years experiencing difficulties. Both interventions are quite time-intensive and would result in Level 3 autistic children being the priority to receive it due to them needing more comprehensive support (Roane et al., 2016).

Joint Attention

ABA also focuses on specific skills that autistic people struggle with. A critical aspect of social development for autistic individuals is joint attention. Autistic people have difficulty initiating joint attention, which involves the ability to show objects, gesture, and share attention nonverbally, typically before the onset of spoken language (Mundy & Jarrold, 2010; Bruinsma et al., 2004). This impacts social and communication skills (Vivanti, 2023). A study by Adamson et al. (2019) revealed that autistic children encounter more challenges with joint attention behaviours such as sharing, engaging with an activity, or initiating with a peer than other neurotypical and neurodivergent children. Furthermore, research by Waddington et al. (2024) highlights the importance of intervening at a young age and encouraging joint attention with a social partner, as it aids children in developing meaningful relationships which correlate with the importance of helping autistic children to improve their developmental trajectories (Mitchell et al., 2011).

Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) is an intervention that targets this skill difficulty and is introduced to children. JASPER aims to cultivate awareness in autistic children of their partner's engagement in the same activity, aiming to foster sharing, taking turns, and requesting items while using play as the teaching medium (Adamson et al., 2019). JASPER is considered NDBI due to its rigorous data collection and extensive literature outlining the importance of encouraging joint attention and replication across various settings such as clinics, schools, and homes (Vivanti, 2023). This intervention has shown promise in improving joint attention initiations, as evidenced by research by Chang et al. (2016), subsequently enhancing the child's joint attention skills. A systematic review by Pacia et al. (2022) found that JASPER was one of the evidence-based interventions to generalise the skills

taught to autistic children. Emphasising early intervention methods, such as JASPER, can greatly enhance the social interaction skills of autistic people (Shih et al., 2021; Shire et al., 2017).

This discussion on JASPER emphasises the significance of teaching joint attention to autistic individuals who find it challenging to engage in this behaviour. Focusing interventions on specific functioning aspects is helpful, as research shows that developing this skill facilitates social interaction and peer initiation (Vivanti, 2023; Pacia et al., 2022; Bruinsma et al., 2004). The aim of examining joint attention is to underscore its profound effect on children's communication and socialisation skills.

Group Intervention- Programme for the Education and Enrichment of Relational Skills

A different variation of ABA-based intervention that differs significantly from EIBI, ESDM, and JASPER is the Programme for the Education and Enrichment of Relational Skills (PEERS). This group intervention teaches communication skills, leading to enhanced social abilities (Fatta et al., 2024). Most research investigating this intervention's effectiveness has been conducted with teenagers. This intervention necessitates participants to possess vocal VB skills for successful implementation, making it best suited for individuals with Levels 1 and 2 autism.

Firstly, small groups are formed to teach skills such as information exchange, conversational practice, and appropriate use of humour. These skills are modelled for the learners, who then role-play with other group members. The next step involves engaging parents in the process. Separate classes are held for parents to learn how to model appropriate behaviour, use prompts to support their child's social skills practice, and encourage participation in social situations (Honan et al., 2023). Involving parents is valuable as it facilitates generalisation, enabling them to coach and model social behaviours in various environments with their children (Strauss et al., 2013). The programme's final step focuses on teaching suitable rules for social

situations and ensuring appropriate social etiquette. Guidelines cover various topics, including not talking over others, refraining from speaking negatively about people, and understanding the appropriateness of humour in different contexts. Providing structure and rules benefits autistic people, who often appreciate clear outlines and guidelines to determine socially acceptable behaviour (Schohl et al., 2014).

Honan et al. (2023) found improvements in social skills, knowledge, responsiveness, and engagement following the intervention. Additionally, maintenance was observed in social communication, responsiveness, motivation, and peer engagement after the intervention was implemented. However, research by Wyman and Claro (2022) found that while this programme benefited individuals with other developmental disabilities, autistic people struggled to implement their learning outside of the sessions.

One drawback of the PEERS programme is that it requires a significant time commitment from parents and young adults. The child and parent must regularly attend multiple training sessions (Honan et al., 2023). Although PEERS effectively connect individuals facing social skill challenges for mutual learning and practice, extensive commitment can be a barrier (Honan et al., 2023). But this highlights the success and importance of having peers and people close to the individual to help them develop and practice new skills

Pivotal Response Training

Pivotal Response Training (PRT) is a naturalistic ABA-informed intervention that integrates developmental psychology ideas to aid autistic people, and it varies from the previous interventions because it focuses on four pivotal skills (Lei & Ventola, 2017). Pivotal skills are fundamental skills or behaviours that, when learned or improved, lead to broad and positive changes across other areas of a child's development, including learning to learn more skills.

These skills are considered "pivotal" because they act as a foundation, enhancing multiple domains of functioning and making learning in other areas easier and more efficient (Koegel et al., 2010). The first pivotal skill is the ability to respond to multiple cues. Autistic people may struggle to recognise and respond to various cues. PRT employs techniques such as stimulus prompting and conditional discrimination to teach this skill effectively (Koegel et al., 1999). By learning to interpret multiple cues, one can focus on more than one aspect of an item, such as someone's facial expression during a conversation. The second pivotal behaviour is initiation. Initiation is asking questions, starting conversations, and requesting things (De Korte et al., 2022). Furthermore, self-management is an aspect of PRT, promoting independence and teaching that consequences result from one's behaviour (Koegel et al., 2010). Self-management encourages individuals to monitor their behaviour, fostering autonomy and reducing the need for constant supervision from others (Cowan & Allen, 2007). PRT addresses motivation as the central pivotal area; the goal is an increased response to social and environmental stimuli. Creating motivation uses reinforcement theory to encourage desired behaviour (Koegel et al., 2010).

An additional way PRT is linked to developmental psychology approaches is that PRT is implemented in the child's natural environment. This ensures that motivational procedures learned are implemented by individuals who interact with the child daily, seamlessly integrating the intervention into their routines (Berman et al., 2018). This intervention uses contingent, natural, and reinforcing efforts towards target skills (Koegel et al., 2010). Moreover, when introducing target behaviours, PRT considers age, cultural relevance, ability level, and family dynamics (Koegel et al., 1999).

PRT was found to effectively improve communication and language skills in autistic people, as indicated by a meta-analysis conducted by Uljarević et al. (2022). A systematic review by Verschuur et al. (2014) found that improved self-initiation, language, and play reduced maladaptive behaviour. Overall, PRT is a structured intervention that emphasises the importance of individual autonomy and motivation towards learning new skills, making it appropriate for all spectrum levels (Koegel et al., 2010; Berman et al., 2018; Lei & Ventola, 2017). It is especially helpful for Level 1 autistic people to implement in a natural, everyday context (Smith & Iadarola, 2015).

Play-Based Intervention

Interventions that use alternative types of interaction, such as play, are paramount in addressing the needs of autistic children (Elbeltagi et al., 2023; Wolfberg et al., 2015). Play-based interventions are an umbrella term used for interventions that utilise play as a medium to teach skills that benefit the child. Play is a fundamental aspect of child development, fostering various skills that can be transferred into everyday situations and facilitating learning in areas such as communication, motivation, and emotional understanding (Charlop et al., 2018; Hart Barnett, 2018). Gibson et al. (2021) observed that play-embedded therapy is more effective when it is child-led, allowing the child to express their preferences and engage with preferred items. Group settings, particularly in schools, offer valuable opportunities for social communication and learning from peers through observation and interaction with one another via play (Elbeltagi et al., 2023).

Social and sensory play can enhance cognitive development, allowing children to explore different textures and experiences while developing important skills. Engaging with toys in

functional ways helps children understand their properties and purposes, supporting their cognitive growth (Charlop et al., 2018).

There are various types of typical play, and some are seen more during different stages of development. Some examples include unoccupied play, predominantly seen in typically developing infants and involves observing and exploring surroundings. The benefit of this is attending to surroundings while developing motor skills. Onlooker play involves observing others playing with each other but not joining oneself. This allows children to learn from one another and understand socially acceptable behaviours (Cugmas, 2011). Parallel play involves children playing side by side without direct interaction (Neal et al., 2022). Cooperative play involves children working together for a common goal, such as building or creating something. Often seen from age four upwards, this encourages teamwork and problem-solving. Pretend play is also a common type of play seen in young children. It involves imaginative play, encourages creativity, and understanding social rules (Veraksa et al., 2024). These types of play offer a range of benefits to children, but it has been found that autistic children do not tend to engage in these types of play (Wolfberg et al., 2015; Hobson et al., 2013). Autistic children tend to engage in more structured and solitary play and exhibit less imagination, alongside parallel play and sharing behaviours (Sheratt, 2002). These play behaviours are considered atypical play and can lead to difficulties in social engagement, as their activities may be less enticing for other children to join, resulting in isolation (Williams et al., 2001).

Overall, play-based interventions hold promise in supporting the development of autistic children. A meta-analysis by Deniz et al. (2022) found that parent-mediated play therapy improved autism characteristics and executive functioning in preschool autistic children. By understanding and addressing the unique play preferences and challenges of autistic people,

interventions can promote social, cultural, and emotional development, fostering inclusivity and support (Fromberg & Bergen, 2015; Gallo-Lopez & Rubin, 2012).

LEGO Therapy

By combining NDBI peer modelling and ABA, LEGO is a play based therapy that aims to foster independence in children, encouraging them to understand and voluntarily produce target behaviours without relying on prompts (LeGoff, 2004; Narzisi et al., 2021). Originally known as a constructive application, LEGO therapy utilises children's pre-existing interests, often characterised by intense focus or "obsessions", common among autistic people (Anthony et al., 2013). Recognising the widespread fascination with LEGO among autistic people, Alderson (1998) explored leveraging this particular interest as a motivational tool to teach new skills, yielding positive results.

In LEGO therapy sessions, children collaborate on LEGO projects, making it a peer-mediated intervention (PMI), with each child assigned a specific role, such as the instructor who directs which brick to select or instructs the builder on arranging the bricks; this necessitates a level of social and VB skills for this intervention to be successful. This intervention aims to foster shared interests and motivation to communicate and work together (Narzisi et al., 2021). LeGoff's (2004) research showed improvements in conversational skills, eye contact, adherence to social rules, turn-taking, and greeting among participating autistic children. Additional research by Levy & Dunsmuir (2020) showed a large positive impact on how long participants engaged in social interaction and increased initiation, with the results showing some generalisation to the home environment.

Moreover, LEGO therapy has been adapted to natural environments such as classrooms, wherein typically developing peers are trained to initiate and respond to social interactions with

neurodivergent peers. Through role-play and video demonstrations, PMI teaches neurotypical children the rules of LEGO, prompting techniques, reinforcement strategies, and social skills, such as responding to questions and initiating conversations with their neurodivergent peers (Hu et al., 2018). The peer-mediated aspect of LEGO therapy ensures inclusivity, allowing autistic children and neurotypical children to interact in a natural setting and fostering mutual learning and understanding (Katz & Girolametto, 2013).

An additional study by Lee et al. (2023) involved four families working with their autistic child. The study used a multiple-probe design and concluded that having the parents and child interact using LEGO as a medium improved the child's spontaneous social interactions and responses. By harnessing the appeal of LEGO as a motivating tool, LEGO therapy facilitates social interaction and skill development, offering a promising avenue for inclusive play-based interventions for autistic children.

Inclusion for Neurodivergent and Level 1 Autistic People

While the previously listed interventions have a robust evidence base that supports traditional interventions for autistic people, they often require structured approaches involving professionals, making them time-consuming and potentially disruptive to daily life. Some of these interventions are particularly beneficial for individuals who are low functioning and face significant challenges, requiring extensive support. However, this focus frequently leaves those who are higher functioning underserved despite their unique needs (Dallman et al., 2021; Roan et al., 2016). This gap underscores the importance of alternative strategies, which can provide targeted support for individuals with Level 1 autism or those identified as neurodivergent. This is particularly important because research carried out by Potvin et al. (2013) found that children who are higher functioning with autism enjoy recreational activities such as arts and crafts,

sports, and play, participating in these activities in a similar amount to their neurotypical peers, but did them in families' and friends' homes rather than in the community, hindering their ability to socialise with others.

Programmes that include engaging elements to boost motivation and promote foundational skills like initiation and joint attention, following intervention strategies like LEGO therapy, may prove advantageous for this group (Lee et al., 2023). These initiatives utilise special interests to build stimulating and effective settings for skill enhancement.

Why Model Trains

Similar to LEGO and aligning with the PRT theory of motivation, trains offer structured play opportunities with specific identifying details and predictable patterns suggested to appeal to autistic people (Javed et al., 2015). The scheduled operations of trains' repetitive movements and sounds provide comfort through predictability and familiarity (Golan et al., 2010). Moreover, the confined path of trains on tracks adds to their appeal, offering a transparent and predictable trajectory compared to other modes of transport (Alhaddad et al., 2019). Research comparing toy preferences between autistic and typically developing children suggests that autistic children are more interested in Thomas train sets than blocks, possibly because they are familiar with these characters (Dominguez et al., 2006). The fascination with trains among autistic people can be attributed to several factors that align with their preferences and sensory sensitivities.

Animated shows such as Thomas the Tank Engine further capitalise on the interest in trains among autistic people. The availability of merchandise related to the show makes the interest more accessible and comforting, facilitating engagement and learning opportunities. Through interaction with Thomas and friends' toys, autistic children develop motor skills, engage

in imitation play, and understand cause-and-effect relationships. The ASD-friendly nature of Thomas the Tank Engine lies in its clear and easy-to-understand storyline, predictable plot, and portrayal of emotions through facial expressions, as common in most children's shows (Javed et al., 2015). By explaining facial expressions and feelings, the show helps autistic people recognise and understand social cues, contributing to their social development.

Recognising the connection between special interests and social development has influenced the creation of interventions designed to use these interests to improve social interactions and communication skills in autistic people. Research by Sivaraman and Fahmie (2018) found improved social initiations when a child interacted with preferred items without prompting, which was generalised across settings.

Gaps in Current Literature

Limited research exists on why autistic people are drawn to trains. Some studies have shown that autistic children prefer interacting with Thomas the Tank Engine toys over other types (Desha et al., 2003). This suggests that while some research links specific toy trains to the interests of autistic children, there is little evidence to explain why autistic people are generally attracted to trains. Additionally, it remains unclear whether this attraction should be categorised as a special interest, similar to LEGO.

Model trains have long been recognised as a respected hobby and community endeavour. Pollard and Carver (2016) examined the benefits of model building and the components of modelling, which frequently entail the upcycling of materials to produce miniature replicas of diverse settings and objects. This research aimed to outline the potential benefits for adults who engage in this hobby and found that it serves as a means of relaxation and a creative outlet. It did not discuss how a model train community can be a tool for socialisation and building

connections with others. This research examined the benefits for adults and not children. More research is needed into the model train community and its potential positive impact on its members and those engaging with model trains. Additionally, there is no research on how conducting model trains rather than making the models can positively impact individuals.

A meta-analysis by Hashmi (2023) examined various research projects on how children play with toy trains and whether there are perceived benefits. The conclusion emphasised the gaps in existing literature regarding the direct impacts of children interacting with toy trains on developmental outcomes compared to other toys. Highlighting the limited literature on toy trains, autism, and model trains underscores the need for more research into what skills children could develop from engaging with model trains.

Importance of Community for People with Autism Spectrum Disorder

A sense of community is crucial for well-being, social and skill development (Milton et al., 2012; Atkinson et al., 2020). Autistic people are often excluded from social environments such as schools (Brede et al., 2017), highlighting the importance of establishing alternative communities that provide safe spaces to feel comfortable, interact and learn from others (MacCormack et al., 2015).

Limited social integration opportunities pose a challenge for autistic people (McConkey et al., 2021). Research indicates that autistic people often desire friendships and social bonds (McConkey et al., 2021). However, Humphrey and Lewis (2008) suggest that autistic people experience reduced enjoyment and initiation in social interactions, which may hinder their socialisation, highlighting the need for environments that motivate and support these interactions.

Community involvement could be a cost-effective way to help autistic people develop, apply, and practise social and communication skills (Cameron et al., 2022). Community-based interventions have the potential to offer a valuable opportunity for autistic people to practise and refine their skills in inclusive, real-world settings (Timmons et al., 2017; MacCormack et al., 2015). Tobin et al. (2014) found that many autistic people expressed interest in joining socially focused groups to foster friendships, underscoring the importance of accessible and organised social opportunities. Furthermore, the study suggests that viewing social support positively can significantly enhance overall well-being. Both informal interactions, such as attending social groups, and formal classes focused on social support, such as PEERS, contribute to improved social functioning for autistic people.

Inclusive, interest-based community programmes have the potential to provide autistic people with natural and motivating settings for practising social skills (Spain & Blainey, 2015). By bridging gaps in support, community clubs can foster the development of critical social and communication skills, empowering autistic people to develop socially within the community (MacCormack et al., 2015; Spain & Blainey, 2015; Cameron et al., 2022).

Example of a Community Intervention

The right4U-adult ASD service (McConkey et al., 2021) is a researched community-based intervention demonstrating the effectiveness of community-based programmes in assisting autistic individuals to improve their social participation and independence. This intervention emphasised the significance of personalised plans tailored to each individual's talents and interests, highlighting the importance of individualised support in fostering community engagement. (McConkey et al., 2021). Through one-on-one sessions and group activities, participants developed social skills, engaged in meaningful interactions, and explored new

experiences within their local communities. The right4U adult ASD service was noted for addressing the social isolation and feelings of alienation faced by many autistic individuals (Griffith et al., 2012). It established inclusive environments where neurotypical and neurodivergent individuals could connect over common interests. Participants and their families noted that this intervention nurtured belonging and acceptance. Furthermore, this inclusive method enhanced social engagement and fostered understanding and empathy among community members.

Purpose of Study

This research reviewed the need for low-resource interventions that support autistic people without requiring significant financial investment or the constant presence of a professional. It emphasises the importance of accessible, community-based approaches designed for children who do not require intensive support (Timmons et al., 2017).

Rooted in theoretical frameworks from ABA, PRT, and principles of LEGO therapy, this thesis presents a descriptive study to explore the potential benefits of a model train club for neurodivergent children. The overarching goal of this study was to assess whether a model train club environment has the potential to facilitate children's social skills and its potential impact on their families. By exploring how shared interests and community involvement can encourage practising and learning skills, this research seeks to contribute to the broader understanding of inclusive, low-cost interventions for autistic people. Ultimately, the findings aim to inform whether this approach merits further investigation.

The study aims to address the following research questions:

- Are there potential benefits for the families who attend the club with their children?
- Does involvement in the club environment potentially facilitate social skill development for autistic children?
- How do the volunteers create a facilitative environment?
- What are the benefits for volunteers or the community at large?

Methodology

Ethics Approval

The University of Waikato's Human Research Ethics committee granted ethical approval for this research (HREC 2024#12)

Participants and Setting

The study occurred in a community club room in a provincial town on New Zealand's North Island. The club room is in a spacious field with a park, including a miniature ride-on railway that runs behind the club. The ride-on trains run bi-weekly on Sundays and during select Saturday evening events. The club was open to the public every Sunday from 10 am to 2 pm, and during special evening events, it was open from 4 pm to 9 pm. The club would have at least four volunteers present on Sundays, either working on layouts or helping children drive the trains.

For a floor plan of the club, review Appendix A. The clubroom had one entrance that had a ramp leading to it. It was an open space with a kitchen to the left and a workshop at the back of the room with partial walls separating the spaces. The room had about five model train layouts at any one time. The main layout was in the middle of the room. At the back of the room was a miniature model train layout with no controllers. The back right corner had a work-in-progress layout with no trains running. The right front corner had a layout with a train running on it, and the front of the room would have portable layouts that interchanged. Lastly, a toy train table was on the right side of the big train layout.

Observing the entire clubroom proved impractical, leading to low interobserver agreement (IOA). After some trial and error, the approach was refined by focusing on specific areas of the room. Three key observation zones, A, B, and C, were identified to maximise

observation reliability and minimise variability. The settings were carefully selected to optimise the likelihood of reliably capturing relevant behaviours.

Setting A

Setting A was in the centre of the room and featured the most extensive model train layout, equipped with seven control panels consisting of buttons, switches, and dials. The observers opted to observe the layout's left-hand side and front side, along with one chair positioned behind a controller, which is coloured black in Appendix A. The area where the opening to the controls was had a chain in front limiting public access and was only accessed when invited in by volunteers. There was always at least one volunteer present to teach children how to conduct the trains. During observation, researchers stood at the back of the room, near the right side of the layout, watching interactions with the trains and others. This position allowed observers to capture behaviours more reliably, as participants faced the observers while interacting.

Setting B

In the front right-hand corner, environment B had two trains that ran on tracks with a dial controller and switches. Behind the controller was a bench for participants, and if a volunteer was present, they supervised and invited children to operate the trains. Researchers observed on the left side of the layout to maintain a clear view of this area, which was compact enough for uninterrupted observations.

Setting C

Setting C was a table of Thomas the Tank Engine toys set closer to the ground, allowing children to interact with the toy trains physically. Researchers stood near the table on the left side

to observe interactions in this area. This setting was easily accessible and encouraged interaction with trains.

There were three groups of participants involved in this research.

Group One: General Public

Group one potential participants were anyone who frequented the club during the observation time. A poster was posted on Facebook and at the club to inform the public of our presence, and passive consent was used for this group as there was an opt-out option. This meant visitors had to inform the researchers that they did not wish to be observed or could choose not to come during our time there. Observation details were not disclosed to the public to avoid influencing behaviour.

Children

Group One participants were children of any gender who visually looked like children, observed based on their presence in the designated setting being observed at the time.

Adults

A group of 20 adult guardians of the children who interacted with the trains was interviewed at the club. These guardians were selected randomly during observation periods, and verbal consent was obtained before questions about their experience at the club were asked.

Group Two: Neurodivergent Children and Their Caregivers

Group Two consisted of two female caregivers, and their two boys, aged six (Jake) and fourteen (Bob), were identified during the Group One phase. Written consent was obtained for both the interview and the direct observations of the children (see Appendix L), and an information sheet about this research phase was provided (see Appendix I), as this aspect involved gathering more detailed personal information.

Group Three: Volunteers

Group Three consisted of five adult male volunteers who helped run the club by building the layouts and/or teaching the children how to conduct the trains. These volunteers participated in a focus group. Volunteers were informed about the interview schedule, and researchers provided an information sheet (see Appendix J). Before participating, they provided written consent (see Appendix K), as the conversations were recorded and could involve personal information.

Materials

Poster

A poster was placed by the clubroom door four weeks before the study. Before our arrival, this poster was also posted on the club's Facebook page and website. The poster informed participants of the research dates and provided our email address for any questions. The poster's purpose was to notify club attendees that we would be researching the train club and to allow them to opt-out if they did not wish to participate (See Appendix B).

Field Diary

A field diary was utilised to record observations about the environment, including the weather, whether directional signs were missing, whether volunteers were present to assist children in operating the trains, and whether anything significant occurred that day.

Attendance

A table was used to record the number of people in the room every 15 minutes, and the specific times the count occurred for the last seven observation sessions (see Appendix C).

Direct observations

A partial interval recording data collection sheet was used to record the behaviours exhibited by participants in each environment for Group One. This sheet contained a code used to describe the social interactions. It allowed for the notation of who the child was interacting with (whether it was an adult, another child, or a volunteer). It indicated whether the child initiated the conversation or whether the other party did. If the behaviour was observed, a code was recorded. If not, a cross was marked down. If the child interacted with the train, a tick would be noted. If not, there would be a cross (see Appendix D). Each box was noted in during the 10-second rest interval

The Group Two observation sheet had additional behaviours, including sharing, joint attention and parallel play. Sharing and joint attention also had codes to establish who initiated these behaviours and who the child interacted with (see Appendix E).

Measures

Using partial interval recording, two behaviours were observed in Group One and five in Group Two. The rationale for selecting these behaviours was that the above research indicates that autistic children have difficulties in these areas, which are beneficial for development. That is why exploring whether they are exhibited at the club was important.

Group One

Partial interval recording was used to observe behaviours for 10-second intervals, followed by 10-second breaks, to note observations. Observations occurred when children were present in the predefined environments. At least 20 intervals were recorded during each observation session. The initial instance of social interaction behaviour in that interval was recorded, regardless of other variations occurring during that interval. The purpose of partial interval recording was to capture a representative sample of observed behaviour. This method

determines whether the behaviour occurs rather than measuring its duration. Thus, the aim was to identify the behaviour's presence without tracking how long it lasts. It allowed the ability to observe multiple behaviours and individuals simultaneously while also helping to reduce observer fatigue by shortening the observation periods (Cooper et al., 2020). The operational definitions for Group One were as follows: ***Interaction with train***- A child handling the train in some way, including using the control panel or touching a train. ***Social interaction-*** Any instance where a child or adult attempts to initiate an interaction with a child, directing their attention to each other and using vocalisations, words, or gestures around the train. Additional details were included to reflect who had initiated social interaction.

Group Two

Partial interval recording was used for Group Two as well. Each child was observed for intervals of 20 seconds and a 10-second break to note down behaviours, with the observation lasting 20 minutes.

Group Two had additional behave

ours observed. The operational definition of the observed behaviours were: ***Joint attention-*** Any instance where one person, adult or child, points at a part of the set-up, and the other person follows the point with their gaze. This can involve the target child and their parent, any other adult, another child, or a volunteer, and it can occur in both directions, the target child pointing or following the point of others. ***Interaction with train***- Any attempt by the target child to touch, operate, or manipulate the control panels or trains. ***Social interaction-*** Any instance where the target child attempts to initiate an interaction with another person, directing their attention to another person and using vocalisations, words or gestures. Any instance where another person attempts to interact with the target child, i.e., another child is talking to the target

child using vocalisations or gestures. Such interactions can involve the target child and their parent, any other adult, another child, or a volunteer. ***Sharing***- physically handing over or accepting a toy from someone else. ***Parallel play***- Any attempt by the target child to touch, operate, or manipulate the control panels or trains physical manipulation of a toy at the same time as another child interacts with the train layout at the same table. A code was included to identify who initiated the joint attention, social interaction and sharing behaviours.

Technology

A Samsung Galaxy S23 with the workout timer app and Samsung wireless headphones signalled when to start an observation. The prompt used to observe behaviours was ‘‘work” and the prompt used to note down behaviours was “rest” for Groups One and Two. A timer was set on the same phone every 15 minutes to signal when to do an attendance count.

An Apple laptop recorded audio for Group Three. The audio recording was securely stored on a university OneDrive account.

Interview

For Groups One (see Appendix F) and Two (see Appendix G), a table of questions with spaces to note down the answers was used.

Focus Group

For Group Three (see Appendix H), a list of questions to prompt conversation was used.

Research Design

This research used a mixed methods design to gather quantitative and qualitative data. Observational data was collected for Groups One and Two using partial interval recording. Qualitative data was gathered through interviews with members of the public in Group One and participants in Group Two, while a focus group was conducted for Group Three. Combining

quantitative and qualitative approaches allowed a comprehensive understanding of behavioural patterns and participant experiences at the club.

Procedure

Group One: General Public

Data for Group One was collected during regular club hours, on Sunday mornings and two Saturday evenings. Initial observations were challenging due to the complex environment and additional challenges creating a low IOA, requiring adjustments in the approach. The observation process was streamlined by reducing and simplifying the number of monitored behaviours. The primary focus was interactions with the model trains and social interactions to enhance procedural integrity and achieve better IOA scores.

Each observation session was limited to around one hour to minimise fatigue, with breaks between observation periods. Observers rotated between data collection and interacting with the public through interviews.

In addition to observations, caregivers of children who interacted with the trains were approached to invite them for an interview using the interview schedule (Appendix F). The interview was conducted in the clubroom, and detailed notes were taken during and after. The interview duration was between one and four minutes. No personal or identifying information was recorded. The caregivers' responses helped to identify potential participants for further research in Group Two.

Group Two: Neurodivergent Children

Group Two consisted of neurodivergent children whose caregivers were initially interviewed during the Group One data gathering. Caregivers received an information sheet (see Appendix I). Upon agreeing to participate in this phase, a time was arranged to observe their

child at the club. Written consent was secured, and caregivers shared their contact information for scheduling.

Using the interview schedule (see Appendix G), in-depth interviews were conducted with caregivers in person or by phone to collect detailed information about the child's neurodivergent diagnosis. These interviews lasted five to ten minutes. In this phase, the children were directly observed during sessions held at a designated time within the normal club hours. To prevent influencing behaviour, the children were unaware of the observation process. Unlike Group One, observations were not limited to specific settings, as each child was the sole focus of observation.

Group Three: Focus Group

The third group consisted of five club volunteers who participated in a focus group. The goal was to understand their perspectives on whether the model train interactions benefited the children and to learn about their overall experiences with the club. The focus group was semi-structured, using predetermined questions as conversation starters. Pseudonyms were assigned to each volunteer to preserve anonymity in the transcript. The club leader was excluded from the focus group as he initiated this research being conducted. The focus group was 45 minutes long and was conducted at the club on a Tuesday. The transcribing process involved listening to the audio and pausing regularly to type out what was said on a document.

Attendance

A head count was conducted every 15 minutes to assess the club's popularity over the last seven weeks of observations. A timer was set to go off after 15 minutes to prompt scanning around the room and counting the number of non-volunteers present.

Document Review

A document review was conducted using the resources available online and those provided by the group leader. This review helped describe the club and its aims and provided a rationale for the research. Along with determining potential recommendations.

Inter-Observer Agreement (IOA)

Trial-by-trial IOA was used to calculate inter-observer agreement by dividing the total number of agreements by the total number of trials multiplied by 100. Inter-observer agreement between 80% and 100% is considered sufficient reliability. IOA was scored after each observation session. Two people conducted the same research and observed simultaneously for 33% of the observation period for Group One and 100% of the time for Group Two.

Table 1

Table of IOA for Group One Behaviours Across Environment A, B and C in per cent

Environment	Interaction with trains (%)	Social interaction (%)
A	94	82
B	98	84
C	97	91

Table 2

Table of IOA for Group Two Observed Behaviours in per cent

Behaviours	Percent (%)
Joint Attention	91
Social Interaction	91
Interaction with Trains	89
Parallel Play	97
Sharing	100

Tables 1 and 2 indicate that all IOA for each group and behaviour are above 80%, which creates confidence in the reliability of this data. As both observers were primary researchers,

there was no training. However, practice observations and examples were discussed to ensure agreement on the behaviours observed.

Data Analysis

Microsoft Excel was used to graph data from Groups One and Two. Inductive reasoning established themes from Group One interviews. Thematic analysis was used to analyse the Group Three focus group transcript. The content of the data determined themes and quotes related to those themes.

Results

Attendance

Attendance indicating how many members of the public frequented the club at specific times and dates is presented in Table 3

Table 3

Number of People Counted in the Room at one Time by Date and Time

Date	Time hh:mm- Count						
11.08.24	10:30-0	10:45-4	11:00-0	11:15-0	11.30-0		
18.08.24	11:15-2	11:30-2	11:45-0	21:00-0			
24.08.24	16:30-1	16:45-6	17:15-12	15:30-24	17:45-20		
25.08.24	12:15-4	12:30-4	12:45-2	13:00-2			
28.09.24	17:00-16	17:15-10	17:30-8	18:00-14	18:15-7	18:30-5	
06.10.24	10:30-6	10:45-20	11:00-20	11:15-16	11:30-4		
20.10.24	10:15-13	10:30-25	10:45-22	11:00-25	11:15-42	11:30-17	11:45-14

Table 3 highlights the number of non-volunteers present during the observation periods. The highest recorded attendance was ranged from 13 to 42 non-volunteers on October 20th, while the lowest recorded attendance was 0, demonstrating a large variation across observation periods. The least attended day was August 18th, with attendance ranging from 0 to 2 non-volunteers.

Incidental Observation

A field diary was maintained during each observation session, capturing attendance patterns and other incidental observations. Attendance was lower on days August 11, August 18, and August 25, often due to bad weather or Sundays when the trains did not run. On these days, no signs indicating the club was open were displayed, which were otherwise present on ride-on-train days. Notes from the field diary highlighted that ride-on train operators stopping by the club and encouraging visitors to go there encouraging participation in the club. The club's distance

from the playground and train boarding area was identified as limiting visibility for newcomers. Additionally, directional signs were observed to be placed along a path near a distant parking area that many visitors did not use, further affecting the club's visibility.

Another key observation was the role of volunteers in facilitating engagement. For instance, on a night when no trains were running in Environment B, and no volunteers were present, visitors briefly looked at the layout but did not interact with the controllers. In contrast, Environment C, which featured toys on a short table accessible to younger children, was observed to feature younger children predominantly and consistently attracted engagement without volunteer facilitation.

Document Review

A document review aimed to understand the club's purpose, what it has done within the community, how it was portrayed online, and what improvements could be made.

Facebook Page

A document review of their social media revealed that the ride-on trains and the train club maintain active Facebook pages to promote their activities. However, there was a disparity in the number of people that follow each page, with the ride-on trains page having over a thousand followers, whereas the train club’s page has fewer than 50. To address this, the club has placed QR codes around the premises, enabling visitors to access their Facebook page easily.

Website

The club maintains a website with seven tabs:

- The Home tab provides the club's address and photos.
- The About Us tab details the club's history and origins.
- The Contact Us tab offers communication details.

- A tab is dedicated to the ride-on trains.
- A recently added Special Project tab included information about this research project and displayed the poster.
- The Sponsors tab highlights supporters of the club.
- A Photo Gallery tab showcases images of the club and its activities.

Newspaper Article

A recent newspaper article by Posselt (2023) featured the club's Thomas Project, a portable Thomas the Tank Engine layout designed to engage individuals with accessibility challenges. The layout, built to fit over a hospital bed or wheelchair, allows individuals in these settings to interact with model trains. The article detailed the unveiling of the layout and included an interview with the project leader, who highlighted its impact.

The project leader shared observations of neurodivergent children engaging with the trains in unique ways, such as sustained concentration and improved social interactions, which parents had not seen at home or school. The leader reported that feedback from a school for neurodivergent children was positive, where a smaller version of the layout was demonstrated. Teachers described it as "one of the most brilliant sessions they had had" and suggested pursuing research to explore its potential benefits. The article also mentioned the club's collaboration with the University of Waikato to conduct an initial study on how interacting with model trains might benefit neurodivergent children and their families.

Funding Application

A funding application for the club was reviewed, providing documentation on its perceived benefits and community interest. Parents and caregivers of autistic children reported that the club offers a supportive space for their children to interact and communicate with others.

Specific examples included children being prompted to teach others how to use controllers, which fosters social engagement. Parents also reported additional skills promoted by the club, such as patience while waiting for turns, hand-eye coordination, following instructions, and cooperative interaction to manage safe train movements.

The funding has enabled the development of lightweight, portable mini layouts that fit in the backseat of a small car and serve as "teaching aids" in schools or homes. The club is currently building four additional layouts. At a recent event, 40 children with heart conditions engaged with the trains, and parents reported increased confidence and enthusiasm in their children as they participated.

The funding application argued several benefits of being involved in the club that have not yet been researched. It was reported that it provides a safe environment, creating a welcoming space for neurodivergent children to explore activities that support their intellectual and social development. Additionally, it fosters skill development by enhancing interpersonal and social skills and builds confidence, particularly for neurodivergent children who may feel marginalised elsewhere. The application also emphasises parental support, empowering parents by demonstrating their children's skill growth. Furthermore, it promotes the normalisation of diversity through the shared activity of "playing trains." Collaborative opportunities are reported by partnering with Waikato University to offer postgraduate students practical experience supporting neurodivergent children. Lastly, community engagement is reported to be encouraged by involving retired hobbyists who use their expertise to support these children.

Group One Observation Data

This section reports the observational data of the behaviours seen in each environment at the club to provide some quantitative insight. It additionally includes the results from brief

interviews with the parents of children frequenting the club, providing qualitative insight into the club.

Figure 1

The Percentage of Observation Intervals that Interaction with Trains and Social Interaction Behaviours were Observed Across Environments A, B and C

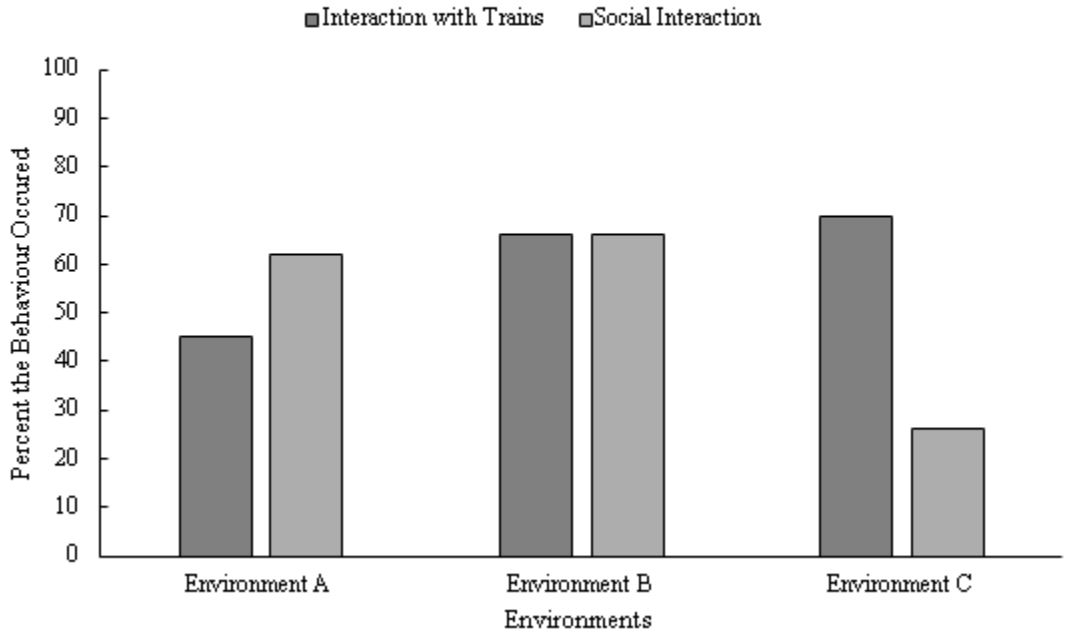


Figure 1 shows that social interaction behaviour occurred in all environments and was observed the most in environment B (66%), then A (62%), and the least in environment C (26%). Figure 1 highlights that social interaction behaviour was seen more than interaction with train behaviour in environment A, with interactions with trains being 45%. This data shows no difference between social interaction and interaction with trains in environment B. The environment that exhibited the most interactions with trains was environment C (70%).

This next section reports details of the social interactions in each environment, including who the child interacted with and who initiated the interaction.

Figure 2

Per cent of Child-to-Adult, Adult-to-Child, Volunteer-to-Child, Child-to-Volunteer and Child-to-Child Interactions Across all Observations in Environment A

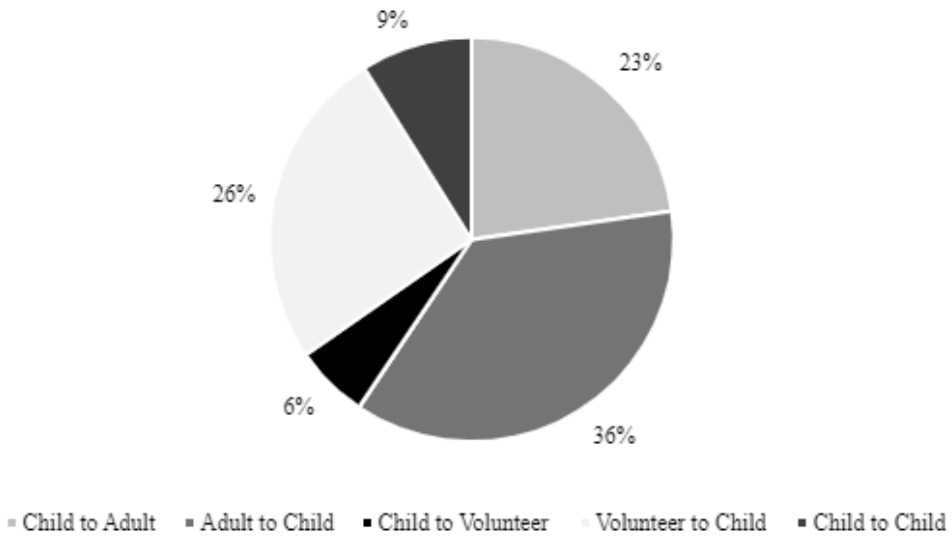


Figure 2 shows the breakdown of environment A's social interactions, which were observed in 62% of observations. The most common social interactions were adult-to-child interactions, at 36%. The second most common social interaction was the volunteer-to-child interaction, at 26%, followed by the child-to-adult interaction (23%). Children interacting with each other occurred 9% of the time. Lastly, children interacting with volunteers accounted for 6% of the social interaction behaviours in this environment.

Figure 3

Per cent of Child-to-Adult, Adult-to-Child, Volunteer-to-Child, Child-to-Volunteer and Child-to-Child Interactions Across all Observations in Environment B

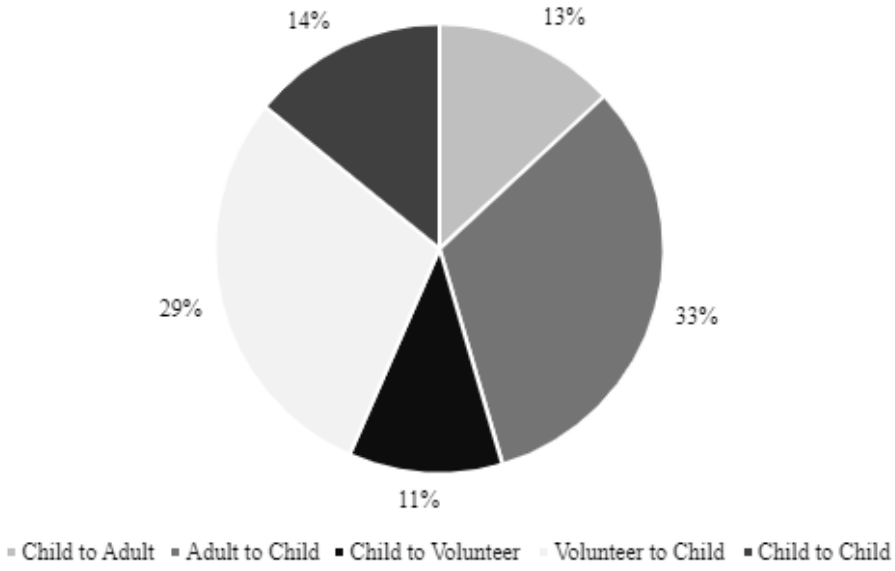


Figure 3 shows the variation of social interaction in environment B, which was observed in 66% of the observations. The most common social interaction (33%) was adult-to-child, and the next was volunteer-to-child (29%). Child-to-child interaction comprised 14%, child-to-adult was 13%, and child-to-volunteer accounted for 11% of the social interaction behaviours observed.

Figure 4

Per cent of Child-to-Adult, Adult-to-Child, Volunteer-to-Child, Child-to-Volunteer and Child-to-Child Interactions Across all Observations in Environment C

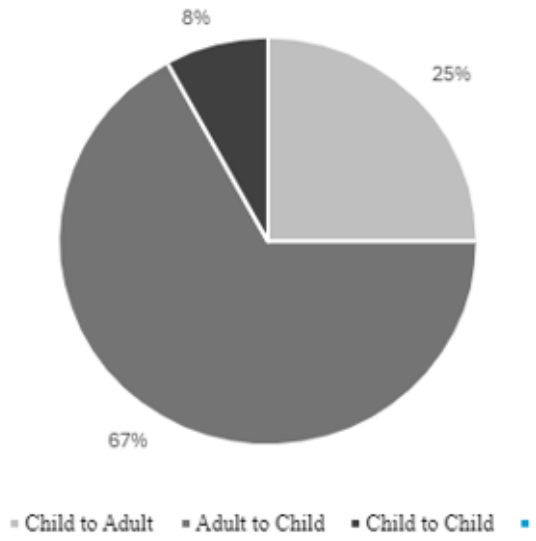


Figure 4 illustrates the social interactions observed in Environment C for 26% of observations. The majority (67%) of interactions were adult-to-child interactions, followed by child-to-adult interactions (25%) and child-to-child interactions (8%); no interactions with volunteers were seen in this environment.

Group One- Interview Data

Brief interviews were conducted with 20 participants using the interview schedule outlined in Appendix F. The data revealed that 45% of visitors lived locally, 70% of interviewees attended the club regularly, and 35% of the participants reported that their children were neurodivergent. Several key themes emerged from the interviews using inductive reasoning (Clarke & Braun, 2016). The most prominent theme was that families were drawn to the club because their children enjoyed trains, with 70% of respondents citing this as their primary reason

for visiting. Other themes included a sense of community (mentioned by 20% of participants) and the friendly, encouraging nature of the club's volunteers (noted by 30% of respondents). An example was a parent reporting they "*appreciate the intergenerational aspect*". Participants also highlighted the club as an ideal family-friendly environment, with 30% appreciating the opportunity for families to socialise and spend time outside the home. Themes of skill-building and educational benefits were also observed, with 30% of parents emphasising the club's contributions to learning. Specific examples included "*children enjoying learning new things"* and noting the club's role in "*language development*."

Neurodivergent Attendees

Of the seven respondents who indicated that their child is neurodivergent, five reported attending the club regularly. Six respondents shared that they or their children enjoy the community or social aspect of the club. An example noted by a respondent was that their child "*enjoys getting outside and socialising with staff*." Three respondents highlighted that their child enjoys interacting with the volunteers, describing them as welcoming. A parent remarked, "*Children love the volunteers. They are helpful, understand the children's needs, and are driven to inspire others.*" Additionally, two respondents reported that the club encourages children to learn new things from others.

Open Discussion Points

This section highlights unique points raised by caregivers that, while not recurring themes, provide important insights. One caregiver noted that the model train setup "*takes up a lot of space*," emphasising the value of a dedicated area for engaging with trains, which is difficult to replicate at home. Another parent shared that their child, who typically feels "*overwhelmed by crowds, becomes more comfortable and engages socially when focused on driving the trains"*.

Similarly, one parent appreciated that "*parents can just observe*," as children are often deeply engaged, allowing parents to relax and enjoy the experience themselves.

Another comment highlighted the inclusive environment, with one guardian expressing appreciation for "*a space that felt safe and supportive*". One parent pointed out the "*value of a separate toy train area"* where children could touch and interact with trains without risking damage to the model trains. Additionally, one parent noted, "*Appreciating the drivable trains, compared to another ride-on-train club that does not have this option, helps children concentrate on a single activity".*

A notable account came from a parent of an autistic child. Although it was their first visit, the child quickly expressed enthusiasm, stating they "*loved it here*" within ten minutes. This parent highlighted the challenge of finding activities that motivate their child and praised the club for "*fostering social interaction and hands-on engagement*". This parent also noted that they "*became aware of the club only through the ride-on trains and decided to visit after passing the club many times on the ride-on train".* Another parent stated that "*the club needs to be advertised more*."

Group Two- Case Studies

Two case studies were conducted to observe if specific behaviours were exhibited by neurodivergent children in the club setting. The case studies consisted of direct observation and an interview.

Case Study One- Bob

Bob was a 14-year-old male. Two observation sessions on separate dates were conducted.

Figure 5

Per cent of the intervals where Bob exhibits joint attention, social interaction, interaction with trains, parallel play, and sharing behaviours during observation sessions.

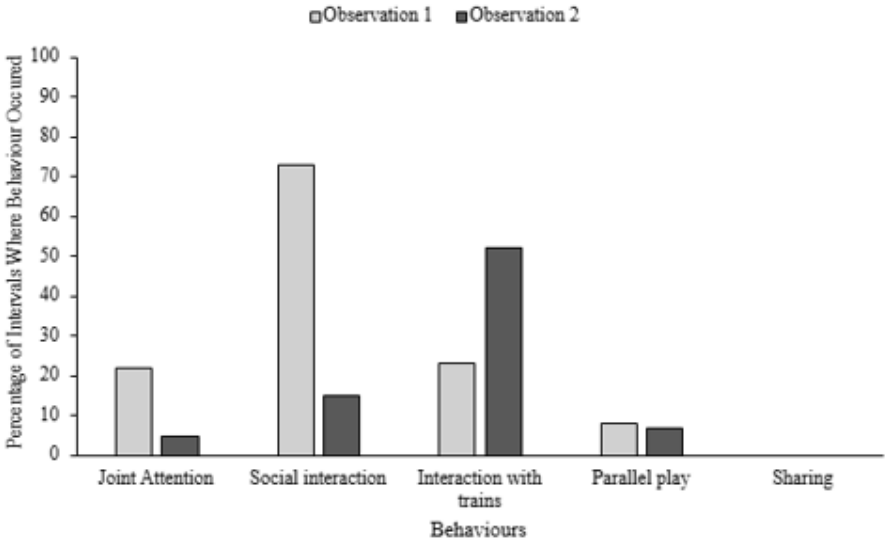


Figure 5 illustrates the percentage of the observation period Bob exhibited the behaviours of interest. Bob exhibited social interaction behaviours for 73% of the first observation session, but in the second observation, he showed social interaction behaviours 15% of the time. He showed joint attention behaviours 22% of the time for the first observation session and 5% for the second. He interacted with trains 23% of the time for the first session and 52% for the second session. He showed parallel play behaviours 8% of the time in the first and 7% in the second session. Although social interactions were more frequent in session one, train interactions were higher in session two. In session two, overall interactions were reduced, but train-focused activities increased. No sharing behaviours were observed during either observation period.

Interview

The interviewee was Bob's mother. The interview revealed that Bob was diagnosed with autism at a young age and exhibited limited joint attention, reduced imaginative play, and

restricted social interactions, such as avoiding peer engagement and hesitating to initiate conversations, which led to his diagnosis (American Psychiatric Association, 2022). The theme that emerged about the family was that they travel from out of town to participate in the club, where they have purchased trains and tracks to create a setup at home.

Participation in the club was perceived to aid Bob in developing social interaction skills by engaging in shared interests. He learns from observing and interacting with other members, which has enhanced his social skills. The interviews also identified challenges the family faces in supporting Bob, including his homeschooling due to the inability of local schools to meet his needs and the limited availability of appropriate services for his level of functioning.

Case Study Two- Jake

Jake was a 6-year-old boy who was observed for one 20-minute session.

Figure 6

Per cent of intervals where Jake Exhibited Joint Attention, Social Interaction, Interaction with Trains, Parallel Play and Sharing Behaviours During the Observation Session.

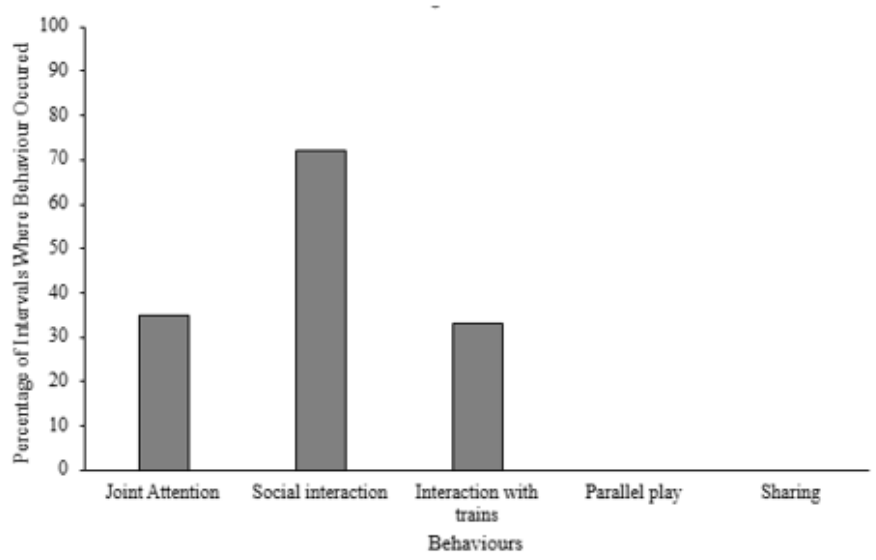


Figure 6 shows the percentage of the observation period during which Jake was observed to exhibit the outlined behaviours. Social interaction was the most frequently observed behaviour, with 72% of the observations involving an interaction between Jake and another person. Joint attention was observed 35% of the time, and interaction with trains was seen 33%. He did not exhibit any parallel play or sharing behaviours.

Interview

The interviewee was Jake's mother; the first interview was conducted in person, and the second was over the phone. Jake's mother reported that he has a range of diagnoses, including ADHD, ODD, and Developmental Delay. A potential diagnosis of Foetal Alcohol Syndrome (FAS) was pending confirmation after age seven.

Key themes reported from the interview were that they live locally; Jake's mother highlighted that the club provides a safe and structured environment for him to explore and engage with guidelines, and she was finding the best strategies to support his needs. Jake's mother reported that the club offers opportunities for social interaction and structured play, such as driving trains. The open hours allow flexibility for families to adapt participation based on individual needs. Jake faces challenges such as limited socialisation and communication skills, along with emotional regulation difficulties that lead to physical outbursts when overwhelmed. Educationally, Jake attends a Ministry of Education school for an hour a day, requires constant care and supervision and is at home with her when he is not at school.

Group Three- Focus Group

The focus group aimed to gain a qualitative understanding of the club from the volunteers' perspective. The themes were divided into two broad categories, the perceived benefits for the volunteers and the club's perceived benefits for the community.

Perceived Benefits for Volunteers

A prominent theme identified was the benefits the club provides to its volunteers. This section will further explore these benefits and their associated subthemes.

Benefits for Retirees

Benefits for retirees was a theme identified, and sub-themes were highlighted throughout. The first sub-theme identified was **combating loneliness**. Three participants specifically outlined retirees' challenges and opportunities in maintaining a high quality of life. All participants appreciated the club's social aspects and opportunities for engagement outside the home. Steve encapsulated this sentiment, stating, "*Personally, social interaction… I'm retired. As many retirees do, you tend to sit at home, drive the computer, watch television, or read. This can become a bit concerning, as you can become extremely isolated*."

Beyond offering social interaction, the club was also reported to address another critical sub-theme being, **creating a sense of purpose for retirees**. Members emphasised how the club provides a structured activity environment, enhancing their daily lives. For instance, David, who retired three years ago, shared, "*Having come out of a profession which involves some responsibility, I was aware that I needed to get into something that gave me a sense of direction and participation… partly social, with other men of my generation*."

Another sub-theme identified was the club's affordability, which makes **participation accessible for retirees**, many of whom live on small incomes. The club charges a fee of two dollars per week, which covers maintenance and utility costs. This affordability was viewed as an important factor in ensuring participation. Richard remarked, "*It costs us $2.00 a week to join this club, and it's a bloody good $2.00 well spent. Where else can you get entertainment like that for $2.00? That's how we look at it."*

Knowledge Sharing

Another key theme highlighted by the volunteers as a benefit of the club for them was its emphasis on knowledge sharing. Knowledge sharing involves teaching one another specific skills, collaborating on techniques, and openly exchanging ideas rather than keeping knowledge to oneself. The sub-theme identified was **knowledge sharing between members**. All five members recognised the culture they have fostered within the club, which encourages participation and inclusivity. Steve reflected on this dynamic, stating, "*We are all thieves together, and we sort of all do our own thing in our unique ways. It is very social, and the amount of sharing that goes on here is quite remarkable."*

The second theme was **knowledge sharing with the community**. Members also reported enjoying being approachable and encouraging the broader community to reach out for guidance, whether about building layouts or learning to operate the trains. Rob emphasised this openness, saying, "*How do you do that? Well, sit down, I'll show you."* He suggested that this spirit of mentorship and sharing could attract people to the club.

Fostering Creativity

Creativity emerged as a central theme among club members. The modelling process involves designing and constructing intricate train layouts, often inspired by specific themes. These themes can range from recreating real-world locations, such as railways in England, to exploring more imaginative and diverse creative approaches. The sub-theme identified was **enjoying creating**, with all five participants emphasising their enjoyment of building models over operating the trains. This was solidified with Mick saying "*I just love doing you know the landscapes, building the houses"*

The second subtheme found was the **resourcefulness of the club**. Much of their creative satisfaction stems from their resourcefulness in using materials from nature and their surroundings. As Rob explained, "*Mother Nature makes so many things out there that you can use… why not?"* This creative resourcefulness also serves as a conversation starter with the public. Steve shared an example of asking others if they can guess what a particular layout component is made from, revealing answers such as cornstarch or a Weet-Bix box. Members source materials from unconventional places, noting that Richard has used *"seed heads from daisies and plants from a McDonald's parking lot"* in his layouts.

Benefits for the Community

The second overarching theme from discussing the club with the volunteers was that they perceive the club as having a range of benefits for the community. The members work hard to create an environment where the community can be involved and learn new things.

Audience Engagement

A prominent theme the focus group members discussed was their techniques to make their train layouts engaging and interactive for the community members who came to view them. A subtheme identified about this was **incorporating items of interest**. For example, they have incorporated TARDIS from Doctor Who and elements inspired by The Hobbit films. They added accidents to the layout, ensuring broad appeal and catering to diverse interests. They encourage the public to search for these items. Rob explained, *"Kids are mad keen on dinosaurs, so send them off on a dinosaur hunt… and even adults will do this, by the way. There are a whole bunch of stories with that. You send the children off on a dinosaur hunt, and the parents will get to see the entire layout, and their comments can be very interesting."* Rob remarked, *"[You need] to*

make each layout memorable so that you will see something on the big layout that will catch your interest, and you will go away remembering that."

Having **an interactive layout** was an additional sub-theme within audience engagement. The interactive aspects of the layouts were reported to have audience members ask questions, sparking dynamic exchanges. Steve shared an example of a young girl asking perceptive questions about his mining-themed layouts, such as, "*What's that?"* These inquiries often lead to engaging conversations. Similarly, Mick recounted his experiences when children actively participated in driving the trains, asking questions like, *"How can I get that to go across there?"* or *"Can you go up and down the station?"*

Affordability for the Public

Affordability for the public was an important theme highlighted by the volunteers. They discussed various ways to make accessing the trains affordable to the community. **Affordability to frequent the club** was a sub-theme identified concerning affordability. The cost of activities plays a large role in shaping how people engage with model trains, and the club was aware of this. Volunteers emphasised their commitment to low costs and making participation accessible to members of the public. Rob illustrated the club's accessibility by comparing the cost of going to the movies with the more affordable option of participating in the club's activities. He explained, "*Ok, you sit down, and you don't actually do anything but use your eyeballs, and perhaps your ears, I suppose to hear it, and you walk out, and you think, 'Oh yeah, that wasn't a bad movie,' but you've actually done nothing. You come in here for a gold coin, and if you want to have a go at something, it probably won't look like much at first. But at least, with people here willing to help and guide you, you might go home and start working on it yourself.".*

Reducing the cost of entering the hobby was an additional sub-theme identified. Recognising the need to attract a new generation to the hobby, the club has also implemented strategies to lower barriers to entry for families. One notable initiative was their focus on the recycling ethic, which involves refurbishing old, non-functional engines and selling them at reduced rates. David emphasised the importance of this approach: *"We either rebuild the hobby and recruit a new generation, or it will die. We're very aware of the costs involved in getting started."* This strategy has proven particularly effective in encouraging new participants. Mick shared an example of an autistic child and his father, whom the club supported, "*We sold them a whole load of gear to get started—tracks, a controller, everything—and they've already completed half the project together."*

Promotes Socialisation

Socialisation is a key difficulty for autistic people, and the members discuss different groups of people who benefit from socialisation as a result of attending the club. **Parent socialisation** emerged as a sub-theme, highlighting how it allows parents to let their children play independently and interact with other adults. Mick and David agreed that while children are captivated by the trains, adults enjoy conversing with volunteers, creating a shared experience for families.

The second sub-theme identified was **socialising for autistic children**. Mick shared an example of a regular attendee with autism, describing how their interaction evolved through participation in conducting the trains. *"I usually find that they won't say anything to anybody, but you get them onto the controller, and they start concentrating on the controller. I think they forget about... then they start talking, you know?"*

Discussion

The model train club community involves volunteers who are passionate about model trains. Every Tuesday and Sunday, they gather to work on the trains, create new designs, and socialise. On Sundays, the club room is open to the public to view and learn how to conduct the model trains. The club volunteers encourage children to drive the trains and teach their peers how to use the controls. The main goal is to share their love of model trains and create a welcoming environment where they can learn from each other and socialise with others.
The group members have reported anecdotal evidence that they have witnessed autistic people who initially have minimal vocal VB skills progress to chatting with the club members about the trains and displaying a wealth of knowledge.

This study aimed to describe the model train club and answer specific research questions about whether the club could benefit autistic children, their families, and the community. It also examined how the members create an environment that has the potential to facilitate learning and practising skills. It focused on Level 1 autistic children or those deemed neurodivergent, who often receive limited support because their condition is perceived as less severe compared to other ASD levels.

Research questions

Question One

Are there potential benefits for the families that attend the club with their children?

As reported in the Group One interview, a potential benefit for children was that the club offers opportunities for skill development. This theme was reported by 30% of respondents. With an example of a parent reporting their "*child enjoying learning new things*", having an environment that creates learning opportunities and skill development greatly benefits children

and their families, as discussed by Timmons et al. (2017). The funding application highlights the club's stated aims to help children learn and practise skills by having them interact with the trains. This was solidified by reports from the focus group and a parent from the Group One interview, reporting that the children enjoy the interactive aspect of the trains. The children can drive the trains with the guidance of volunteers, making visits to the club both interesting and engaging. Open discussion points highlighted the advantages of allowing children to drive the trains rather than observing them, encouraging kids to concentrate on one activity, in contrast to the ride-on options offered elsewhere, which do not include drivable trains. The unique availability of drivable trains further reinforces the club's emphasis on maintaining attention and promoting child-led, hands-on involvement. Child-led play benefits children, as Gibson et al. (2021) indicated in their research.

The observational data from Group One reveals that the children attending the club engaged with the trains, with train interactions noted in Environment A at 45% of observations, Environment B at 66%, and Environment C at 70%. Engaging with toys in functional ways has been shown to benefit children's cognitive development, according to Charlop et al. (2018), which underscores the potential benefits of interaction with trains for children and their families.

According to the focus group, interactions with the trains motivate children to initiate conversations and learn how to operate the trains. This utilises principles from PRT to foster and develop social interaction skills, as the child is motivated to engage with others to achieve the desired outcome of driving the trains (Koegel et al., 2010).

Evidence of social skills practised in the club was seen in the observational data, which showed the rate and range with whom children had social interactions within the club environment. Results from Figure 1 indicate that model train environments encouraged more

conversations between children and others compared to the toy train setting. This finding was interesting, given the established notion that play promotes social skills, as indicated by Charlop et al. (2018). The intricate variations of the model train setups likely facilitated this increased engagement, as the model train environment was novel and had not been seen before.

Seeing interaction with train behaviours being lower than social interaction in Environment A indicates that interacting with others was not reliant on utilising train controls. This does not align with some parent and volunteer reports, which stated that for the child to socialise with someone, they needed to be driving the train as a distraction. The people who reported this discussed neurodivergent children, which could be why the general public data differs from these reports.

Further insights into who initiated social interactions were reported in Figures 2, 3, and 4. Findings revealed that adults initiating conversations with children was the most common occurrence in all environments. Adult support was needed for the visibility of the layout, with many children relying on caregivers or stools to engage in the model trains due to height restrictions, which could, in turn, require more conversation in the model train environments. Environment B exhibited the largest variability in social interactions, indicating that children conversed with a diverse range of people. Although adults remained the primary initiators of interaction, children also engaged more frequently with peers and volunteers in this environment, likely due to its layout allowing two children to sit beside each other behind the controls, alongside competitive elements introduced by the two circular train tracks on this layout. This suggests that the environment can promote specific behaviours and encourage various forms of play, like parallel play, which, as reported by Neal et al. (2022), is advantageous to social skill development.

The second largest social interaction was with volunteers initiating conversations with the child. This occurred only in Environments A and B but was notably absent in Environment C. This absence could be attributed to the independence afforded by the toy trains. Unlike the toys, the model train layouts required a volunteer to invite children to use the controllers and teach them how to operate.

Interactions between children in environment C were minimal. This trend echoes the results in Environments A and B, where child-to-child interaction was 6% and 11%, respectively. The limited interactions in Environment C may also stem from familiarity with the Thomas Tank Engine toys. Research by Hashmi (2023) found that children are familiar with toy trains, suggesting that this environment provided a more self-sufficient play experience and reduced engagement in conversation. Notes from the field diary observations indicated that younger children were more common in this environment, which means they may have had less developed verbal and social skills, resulting in fewer interactions than older children in other settings (Langford, 2005). This data shows that children talk with others about an item of interest, which, as discussed by Waddington et al. (2024), is beneficial for skill development and practising current knowledge in a safe environment. It also benefits families by allowing them to converse over a shared activity, giving them purpose and the ability to bond.

Notably, 70% of interviewees visit the train club because their children enjoy trains. As Huntington et al. (2023) suggested, aligning a potential intervention with stakeholders' interests is crucial to ensuring social validity. This indicates an additional benefit for families as they are motivated to frequent the club because their child enjoys it.

As discussed by the parents in Group One, a benefit for caregivers was that children could engage with the trains independently, allowing parents a moment to relax. This dual

benefit for both children and caregivers was also addressed in a focus group with the volunteers, who acknowledged the value of enabling parents to converse with them while their children engage with the trains independently. The ability for parents to socialise with the volunteers and other adults was valuable as it helps combat social isolation and creates inclusivity for all families, and inclusion, as discussed by Milton et al. (2012), is essential for well-being. Specifically, 30% of respondents reported appreciating the family-friendly aspect of the club environment, highlighting how this was important to caregivers. The reports of the inclusive and supportive nature of the club resonate with Tobin et al.'s (2014) findings on the importance of fostering environments where families feel welcomed and safe. The value of the sense of community that the club provides to caregivers was reported by 20% of interviewees, highlighting the importance of this aspect as research by Atkinson et al. (2020) discussed that community involvement is important for individual well-being.

Another advantage for families visiting the club is the low cost of this activity. As the observational data indicates, a gold coin donation allows children to drive and observe the trains. Offering a budget-friendly option for families is significant since accessing activities can be challenging due to financial constraints.

Question Two

Does involvement in the club environment potentially facilitate social skill development for autistic children?

The document review reported the skills that neurodivergent children can develop while attending the club, drawing on anecdotal reports from parents who have observed positive changes in their children's behaviour. These include encouraging social skills, learning to take turns, and practising patience. According to the funding application and a supporting newspaper

article, these improvements are attributed to interactions with model trains and peers who teach them how to use the controllers.

The focus group offered valuable insights into how the volunteers perceive the club and its role in helping children develop social skills. The members understand that the layout plays a significant role in engaging children with the trains. This was emphasised by Rob, who stated, "*You have to make the layout memorable*." With this at the forefront when designing the layout, they have tried to ensure it is engaging and interesting for the audience. These approaches foster joint attention by encouraging parents and children to focus on the same layout elements, creating opportunities for bonding and dialogue as they search for unique features together (Mundy & Jarrold, 2010). The Group Two observational data highlighted that joint attention behaviours were seen in the club, solidifying this claim. As discussed by Vivanti (2023), having difficulty with joint attention skills hinders social skill development, indicating that it is important that this environment was seen to encourage this skill. Mick highlighted another example of skill development regarding an autistic child who attends regularly. He reported that this child does not tend to talk to people, but when using the controllers, he progressed towards speaking to others. Guardians interviewed at the club emphasised its potential for skill development, with 30% noting that one of its primary benefits was teaching their children new things. This highlights the club's role in fostering learning, illustrated by a guardian's comment regarding "*language development*," which is a helpful skill for social communication (Fuller & Kaiser, 2020). Observational data from Group One revealed that social interactions occurred across all environments, corroborating parents' claims that this setting promotes social skills.

Moreover, five out of seven parents of neurodivergent children from Group One reported regularly attending the club, indicating a strong incentive to return. Six guardians also recognised the social aspect of the club as a key benefit, with three specifying that their children enjoyed socialising with volunteers. Most parents' acknowledgements of the club's social benefits illustrate the significance of this environment in developing social skills. Research by Cameron et al. (2022) corroborates this, highlighting the importance of engaging in social settings to encourage skill acquisition. A particularly poignant account from a parent of an autistic child illustrated how the club effectively supports neurodivergent individuals by facilitating meaningful interactions and social engagement.

The club's potential to facilitate social skills among autistic children became particularly clear in the case studies of neurodivergent children. Bob exhibited various skills, such as joint attention, social interaction, and parallel play—actions not frequently seen in autistic children (Sheratt, 2002; Vivanti, 2023). This is significant as it demonstrates his capacity to display these behaviours in this environment. Research on LEGO therapy by LeGoff (2004) found that participants exhibited positive changes in their socialisation behaviours while using LEGO to foster communication and interaction, highlighting that previous interventions have had similar positive outcomes. Figure 5 illustrates how often Bob exhibited behaviours, showing a large variation in social behaviours compared to interaction with train behaviours across different sessions. In the second session, more interactions focused on the trains than social interactions and joint attention occurred. This finding contrasts with the results from Group One, which indicated that engagement with the trains did not influence social interaction behaviours. He exhibited parallel play by utilising the controllers next to another child, a positive social interaction behaviour (Sheratt, 2002). These behaviours benefit Bob by helping him build and

practice essential social skills (Charlop et al., 2018; Shih et al., 2021; Vivanti, 2023; Kabashi & Kaczmarek, 2017). This observation indicates that the club has the potential to provide a comfortable environment for Bob, allowing him to learn from others, engage in activities independently, and practice valuable social interactions.

While there was only one observation session with Jake, figure 6 also showcased his skill range. Although he did not display any parallel play or sharing behaviours, he exhibited joint attention behaviours more than Bob, which aligns with the literature as Jake is neurodivergent. The literature outlines that autistic people struggle the most with joint attention behaviours compared to other neurodivergent and neurotypical individuals (Adamson et al., 2019).

Examining the field diary reveals reasons for the differences in Bob's skills during the second session and why Jake did not display parallel play or sharing behaviours. This may be linked to the sessions when no train rides were available. This led to no other members of the public being present in the room during these observations. However, with fewer people in the club, it was easier to interact with the trains. Incidental observation revealed that Bob's mother was also not in the room for most of the second session, limiting his social interaction with her, one of his usual conversational partners. Jake's lesser skill variation could be attributed to the field diary indicating that Jake only interacted with environment A. These behaviours could be absent due to his limited interaction with the toy trains, which, as research suggests, play typically prompts sharing and parallel play behaviours (Neal et al., 2022; Veraksa et al., 2024). This indicates from the data that the environment has a role in interactions. It highlights the difficulty for children to exhibit skills if there was no one to share them with, as indicated by two of the three observation sessions, which had no other members of the public present at the time.

This solidified previous research by Atkinson et al. (2020), which stated that interacting with others aids learning and practising social skills.

Although Bob and Jake's circumstances differ in some respects, their case studies reveal notable similarities. A key finding from the observations was the emphasis on social interaction, which was the primary behaviour for both boys. Each engaged in social interaction for over 70% of one of the recorded observation times. Both boys frequently interacted with the trains and demonstrated joint attention abilities while at the club.

The second interview with their mothers found a commonality between the boys, as neither Bob nor Jake attends traditional schooling. As discussed by Brede et al. (2017), this limits their opportunities for peer interaction compared to children who participate in regular school settings, isolating them from typical daily interactions. The mothers also appreciated the sense of community and the club's socialisation opportunities. The findings from these case studies align with reports from those identified in the focus group discussions and the interviews in Group One (such as the benefits of socialisation and the inclusive community). These data points highlight the club's potential to develop social skills and foster learning. The interviews demonstrate the difficulties faced by the parents of these children and showcase the club's ability to create an inclusive environment, which, as reported by Potvin et al. (2013), is essential for neurodivergent individuals. The observational data and community reports show positive outcomes for the neurodivergent population and echo earlier community research aiding autistic people (McConkey et al., 2021).

Question Three

How do the volunteers create a facilitative environment?

The newspaper article and the funding application discussed the club's initiative to create portable model layouts to reach individuals who may find the typical club environment challenging for various reasons. This demonstrates the club's commitment to assisting people with a range of difficulties and showcases a purposeful approach to making model trains more accessible. Such accessibility is crucial for involvement and reflects an ecological perspective in supporting neurodivergent individuals as the club adapts environments that cater to other's needs (A. Graber & J. Graber, 2023).

The focus group reported further examples of making the club a facilitative environment by making the model train environment interactive and interesting for many. One key approach was to incorporate items of interest that engage attendees. By including a diverse range of items, such as the TARDIS from Dr Who and elements from the Hobbit, they aimed to attract a broader audience. These items facilitate a scavenger hunt across the layout, assigning tasks such as searching for dinosaurs or identifying accidents. This strategy captivates visitors and encourages conversations among parents, children, and volunteers. The data from Group One illustrates the variety of individuals children interact with in model train settings. Vivaniti (2023) explored methods for fostering joint attention and its implications; the design strategies are consistent with this research, suggesting that they can enhance joint attention as both the child and parents engage with a common object and share a mutual interest in a task.

This research highlights that community conversations revealed a strong belief in the value of volunteers in this area. In Group One, 30% of respondents recognised volunteers as an asset to the club, with one stating they were "*driven to inspire others*." Furthermore, half of the parents of neurodivergent children indicated that volunteers positively impact the club and assist their children. This was supported by observational data showing that volunteers in environment

A initiated social interactions 26% of the time, while children did so 6% of the time. In Environment B, volunteers initiated interactions 29% of the time, compared to 11% initiated by the children.

The volunteers' purposeful structuring of the environment to suit various children did not go unnoticed. A parent discussed appreciating the toys added to this environment, as their child could play freely. The volunteers acknowledged that because the children cannot touch the model trains, there should be a space to play freely without restriction, as solidified by the large interaction with trains seen in that environment during the observation sessions.

An important aspect discussed was creating an interactive environment. During the Group One interview, a parent and several volunteers highlighted the importance of letting children drive the trains. This encourages discussions about train operations and inquiries regarding layout features. These interactive experiences foster dialogue as children look for information to operate the trains. This method aligns with the principles of PRT outlined by Koegel et al. (2010), emphasising that children may start conversations motivated by the desire to achieve something rewarding, which, for them, is the experience of driving the trains.

Additionally, as reported by the volunteers, they create a facilitative environment by making it affordable for people to attend the club. One of the volunteers compared frequenting the club to going to the movies, which has a large price difference. This comparison highlights the hands-on nature of the club, where participants actively engage with the hobby, contrasting it with the passive consumption of entertainment from a movie. Making the club's price a gold coin donation makes it much more accessible for community members. For families, especially those with autistic children, the financial burden of hobbies or interventions can often be a barrier, as discussed by Thabrew & Eggleston (2018). The attendance data solidifies that people are drawn

to the club as there are periods with large attendance numbers, indicating the efforts made to be affordable have allowed a larger variety of families to frequent.

The volunteers enhance accessibility to the hobby by refurbishing model trains and tracks for resale at reduced prices. They recognise that this hobby can pose a financial challenge for some enthusiasts. Bob received some of their refurbished equipment, and his mom noted that he was working on it with his dad, allowing him to participate in this activity at home. As highlighted in the focus group discussions, this effort aligns with the club's broader goal of engaging more community members in the hobby and attracting a younger generation.

The volunteers expressed pride in their knowledge sharing, noting that they are eager to share various skills with the public, encouraging greater engagement in the hobby. Their willingness to personally guide others showcases how volunteers contribute to skill development within this community. They reported taking the time to sit down with individuals and show them how to engage.

The field diary revealed that children rarely engaged with the model trains in environments without volunteers, particularly noted in environment B. This finding underscores the importance of having a volunteer near the model train setup to promote and guide children using the controls. Children are less likely to participate without this support, emphasising volunteers' essential role in fostering these interactions. Observations from Group One indicated that volunteers often took the initiative to engage with children in the model train areas, which could indicate how they boost children's involvement. Creating a community focused on support and encouraging participation is crucial, as evidenced by the research conducted by Timmons et al. (2017), further validating the important work of volunteers.

The volunteers aim to boost interaction with their train club by enhancing the accessibility of their Facebook page, creating a QR code posted throughout the club, and establishing a dedicated website. These efforts are intended to engage the community further and promote club awareness through various online forums. Unfortunately, the club's Facebook page has fewer than 50 followers, while the ride-on trains have over a thousand followers. This indicates a community interest in train activities but suggests that the club may not be as well-known.

During a Group One interview, a parent pointed out that "*the club needs to advertise more*". An additional parent reported that they had visited the ride-on trains many times but only decided to visit the model train club for the first time during the interview. Their child enthusiastically remarked that they "*loved it here*," underscoring the need for greater visibility for the club.

To enhance the club's recognition, adding directional signs near the area where people wait for the ride-on trains could be beneficial. Additionally, incorporating pictures of the layouts on these signs would help passers-by understand what is inside the building. Increasing social media engagement can also be achieved by posting more frequently on the Facebook page, modifying the page's name for easier discoverability, and organising events focused on building specific model features or teaching train operations. If these activities are advertised appropriately, they could also aid the club's visibility.

Overall, the volunteers are committed to expanding the club's awareness and would greatly benefit from minor adjustments to their social media strategy and signage. Increasing public awareness of the club could lead to greater outreach within the community. Research by Cameron et al. (2022) reports the importance of community involvement and the potential to

encourage skill-building and learning. This model train community has the potential to do the same.

Question Four

What are the benefits for the volunteers or community at large?

An indicator that the club benefits the community is the attendance rate at the club. Table 3 shows attendance rates, which indicate community interest in the trains. This is beneficial and supports the argument that the club is socially significant because it has a range of attendance, the highest being 42 community members in the room at once. However, the varying number of attendees on specific days suggests differing interest levels in the club. The field diary offered additional context to explain fluctuations in attendance, such as weather, volunteer availability, and the fact that the ride-on trains that drop off passengers at the club do not run weekly. Fewer people frequented the club during the weeks without the ride-on trains or during bad weather. The high attendance rate day suggests an interest in the train club and train activities, indicating it is an important activity for the community to be involved in.

One participant in Group One mentioned that the club's intergenerational aspect benefits the community. This highlights the club's broader social significance, which enhances community connection and involvement. This aligns with Cameron et al.'s (2022) findings that community involvement benefits people's social skills and well-being.

The focus group's overarching themes are the club's benefits for the community and the volunteers. One of the themes seen as beneficial was that engaging in this hobby promotes creativity. Creativity in model train layouts arises from being resourceful and using unconventional materials. This hobby aspect is less structured and rule-bound, meaning engaging with model trains can appeal to people with various preferences. This flexibility can benefit

many individuals within the community and encourage participation, as research by Gibson et al. (2021) found that participating in activities aligned with individual preferences was beneficial for gaining social connections. Another perceived benefit that was a prominent theme throughout the focus group was the advantages for retirees. They reported that the club helps give them purpose and combat isolation. This benefits the broader community because the club is providing a safe, reliable space for retirees to engage with others and give back to the community through this activity where people frequenting the club can experience a space that has the potential to practice and develop skills, as well as have retirees engaged in meaningful activities which are known to help with building connection and socialisation (Milton et al., 2012).

Limitations

A key limitation of this study was the challenge of collecting reliable observational data. Ethical constraints prevented video recording, making capturing complex or fleeting behaviours, such as pointing (joint attention) difficult. Despite dividing the room into observation zones, simultaneous monitoring of multiple people proved challenging, resulting in missed behaviours and compromises in data quality. To address this, observation methods were modified multiple times, simplifying the observed behaviours, which included removing joint attention from Group One observation and only having it for Group Two. Regularly calculating IOA in real-time could have helped identify discrepancies and improve data reliability. Using partial interval recording further limited the accuracy of behaviour rates, as repeated behaviours within an interval could only be noted once. Notably, back-and-forth conversations were also difficult to capture accurately with the chosen observation method. However, this method tends to overestimate behaviour rates, which informs the confidence that some missed behaviours did not compromise the data quality. Additionally, the interview data in Groups One and Two were not audio recorded, resulting in relying on detailed notes being taken at the time of the interview. This also compromises data reliability due to the inability to refer to the audio to verify what was said.

Limited observation opportunities compounded data collection challenges, as the club was open only on Sundays and sometimes had no public visitors. For Group Two, attempts to capture detailed behaviour initiation data for joint attention, social interaction, and sharing were hindered by IOA discrepancies. This could have been due to having too many behaviours to observe simultaneously compared to Group One, which only had two. Additionally, clearer instructions to address multiple behaviours occurring during an interval should have been discussed, and the observation interval time should have been shortened.

After frequenting the club regularly, it was understood that attendance rates varied, resulting in the decision to measure this. Attendance data collection was challenging; counting people in the room every 15 minutes led to people being counted more than once because they had been in the club for an extended time, and some people were not counted because they visited between counts. A sign-in system could have streamlined this process, though it would depend on participant compliance and could have ethics complications.

Another limitation was the limited representativeness of the participants. This included the absence of specific diagnostic information for the children observed. Although this study focused on ASD, only one child with a confirmed ASD diagnosis participated in Group Two, limiting the sample's representativeness. Furthermore, Group Two consisted of males, while Group One lacked gender data that could enhance understanding of the population. Ethical limitations restricted further inquiries for Group One, resulting in a broad definition of neurodivergence and limited specifics.

Potential for Future Research

This initial investigation provides valuable insights for future research on clubs or specialised interests and their potential advantages for neurodivergent individuals, both children and adults. The findings suggest that such environments foster skill development and could apply to other community activities. Future studies could benefit from methods like video recording interactions, audio recording interviews, and incorporating more case studies to enhance the research quality.

Furthermore, this study primarily centred on autistic children; expanding this exploration to include other neurodivergent children and adults could yield important insights. A key theme emerging from the focus group was the club's benefits for retirees, which this research did not examine deeply. Further investigation into how the club can alleviate isolation and support the broader community would be advantageous.

Future studies might examine behaviours before and following club participation, providing quantitative data to back up anecdotal reports that the club promotes verbal behaviour. This would involve identifying nonverbal neurodivergent individuals without prior experience at the club, observing their behaviour in different settings, and then introducing them to the club to see if any changes occur in their verbal behaviour. Another comparative study might involve observing children's behaviours across various settings to see if there are notable differences between the club and alternative environments. Investigating the effects of portable train exposure on children’s behaviours could also be a promising area for future research.

Conclusion

This research represents one of the initial studies exploring the potential advantages of a model train club for autistic children. A mixed-methods approach was utilised to address the research questions. The findings indicated that social interactions and interactions with trains occurred within the club, with neurodivergent children demonstrating joint attention alongside these interactions. Additionally, parents of neurodivergent children reported that their child was not enrolled in typical schooling, suggesting that the club may play a significant role in fostering social interactions for these children. Furthermore, it was found that the club provides benefits not only to neurodivergent children but also to other community members, including retirees, parents, and families, who also find value in this community.

However, further research is needed to confirm whether this environment consistently supports positive social behaviours in autistic people. Future experimental studies could investigate the club's long-term impact on specific social skills, and this could be expanded to different neurodivergent groups.

Additionally, this research supports existing literature showing that autistic children often have a strong interest in trains, which was reflected in the number of neurodivergent children who visited the club. Insights from LEGO therapy literature indicate that including items of interest can foster positive behaviours (LeGoff, 2004). This led to the hypothesis that model trains might promote social skills and teach new skills to autistic children. Observations of social behaviours around the model trains suggest this approach has potential.

Overall, this descriptive study provides preliminary answers to the research questions, highlighting the club's perceived benefits for diverse individuals and the community. Volunteers

have made notable efforts to create a supportive environment, designing engaging layouts, fostering conversation, encouraging children to share train-driving skills, and ensuring a welcoming atmosphere for all visitors.

References

Adams, M. A. (2000). Reinforcement Theory and Behavior Analysis. Behavioral Development Bulletin (Philadelphia, Pa.), 9(1), 3–6. https://doi.org/10.1037/h0100529

Adamson, L. B., Bakeman, R., Suma, K., & Robins, D. L. (2019). An Expanded View of Joint Attention: Skill, Engagement, and Language in Typical Development and Autism. Child Development, 90(1), e1–e18. https://doi.org/10.1111/cdev.12973

Afsharnejad, B., Falkmer, M., Black, M. H., Alach, T., Lenhard, F., Fridell, A., Coco, C., Milne, K., Chen, N. T. M., Bölte, S., & Girdler, S. (2020). Cross-Cultural Adaptation to Australia of the KONTAKT© Social Skills Group Training Program for Youth with Autism Spectrum Disorder: A Feasibility Study. *Journal of Autism and Developmental Disorders*, *50*(12), 4297–4316. https://doi.org/10.1007/s10803-020-04477-5

Alderson, J. (1998). [Review of *Asperger's Syndrome: A Guide for Parents and Professionals*]. *British Journal of Clinical Psychology, 37*(4), 470–471.

Alhaddad, A. Y., Javed, H., Connor, O., Banire, B., Thani, D. A., & Cabibihan, J.-J. (2018). Robotic trains as an educational and therapeutic tool for autism spectrum disorder intervention. In *Robotics in Education: RiE 2018 Conference Proceedings* (pp. 249–262).

Alkhudiry, R. (2022). The Contribution of Vygotsky's Sociocultural Theory in Mediating L2 Knowledge Co-Construction. *Theory and Practice in Language Studies*, *12*(10), 2117–2123. https://doi.org/10.17507/tpls.1210.19

American Psychiatric Association. (2022). Diagnostic and statistical manual of mental disorders (5th ed., text rev.). American Psychiatric Association Publishing.

Anderson, K. A., Sosnowy, C., Kuo, A. A., & Shattuck, P. T. (2018). Transition of individuals with autism to adulthood: A review of qualitative studies. *Pediatrics, 141*(Suppl 4), S318–S327. https://doi.org/10.1542/peds.2016-4300I

Arnold-Saritepe, A. M., Phillips, K. J., Taylor, S. A., Gomes-Ng, S., Lo, M., & Daly, S. (2023). Generalisation and maintenance. In A. Author & B. Editor (Eds.), *Handbook of applied behavior analysis for children with autism* (pp. 415–433). Springer International Publishing. https://doi.org/10.1007/978-3-031-27587-6_21

Anthony, L. G., Kenworthy, L., Yerys, B. E., Jankowski, K. F., James, J. D., Harms, M. B., Martin, A., & Wallace, G. L. (2013). Interests in high-functioning autism are more intense, interfering, and idiosyncratic than those in neurotypical development. Development and Psychopathology, 25(3), 643–652. https://doi.org/10.1017/S0954579413000072

Atkinson, S., Bagnall, A.-M., Corcoran, R., South, J., & Curtis, S. (2020). Being Well Together: Individual Subjective and Community Wellbeing. *Journal of Happiness Studies.*, *21*(5), 1903–1921. https://doi.org/10.1007/s10902-019-00146-2

Baer, D. M., Wolf, M. M., & Risley, T. R. (1987). Some still-current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 20*(4), 313–327. https://doi.org/10.1901/jaba.1987.20-313

Berman, S., Ventola, P., & Gordon, I. (2018). Improvements in micro-level indices of social communication following Pivotal Response Treatment (PRT). Research in Autism Spectrum Disorders, 51, 56–65. https://doi.org/10.1016/j.rasd.2018.04.003

Bloh, C., & Axelrod, S. (2008). Ideia and the means to change behavior should be enough: Growing support for using applied behavior analysis in the classroom. *Journal of*

Early and Intensive Behavior Intervention, 5(2), 52–56. https://doi.org/10.1037/h0100419

Bottini, S. (2018). Social reward processing in individuals with autism spectrum disorder: A systematic review of the social motivation hypothesis. *Research in Autism Spectrum Disorders*, *45*, 9–26. https://doi.org/10.1016/j.rasd.2017.10.001

Brede, J., Remington, A., Kenny, L., Warren, K., & Pellicano, E. (2017). Excluded from school: Autistic students' experiences of school exclusion and subsequent re-integration into school. *Autism & Developmental Language Impairments*, *2*. https://doi.org/10.1177/2396941517737511

Bruinsma, Y., Koegel, R. L., & Koegel, L. K. (2004). Joint attention and children with autism: A review of the literature. *Mental Retardation and Developmental Disabilities Research Reviews*, *10*(3), 169–175. https://doi.org/10.1002/mrdd.20036

Buschbacher, P. W., & Fox, L. (2003). Understanding and Intervening With the Challenging Behavior of Young Children With Autism Spectrum Disorder. *Language, Speech & Hearing Services in Schools*, *34*(3), 217–227. https://doi.org/10.1044/0161-1461(2003/018)

Caemmerer, J. M., & Hajovsky, D. B. (2022). Reciprocal Relations Between Children's Social and Academic Skills Throughout Elementary School. *Journal of Psychoeducational Assessment*, *40*(6), 761–776. https://doi.org/10.1177/07342829221097186

Carter, E. W., Harvey, M. N., Taylor, J. L., & Gotham, K. (2013). Connecting youth and young adults with autism spectrum disorders to community life. *Psychology in the Schools, 50*(9), 888–898. https://doi.org/10.1002/pits.21716

Cameron, L. A., Borland, R. L., Tonge, B. J., & Gray, K. M. (2022). Community participation in adults with autism: A systematic review. *Journal of Applied Research in Intellectual Disabilities : JARID.*, *35*(2), 421–447. https://doi.org/10.1111/jar.12970

Cappe, E., Wolff, M., Bobet, R., & Adrien, J.-L. (2011). Quality of life: a key variable to consider in the evaluation of adjustment in parents of children with autism spectrum disorders and in the development of relevant support and assistance programmes. Quality of Life Research, 20(8), 1279–1294. https://doi.org/10.1007/s11136-011-9861-3

Carter, E. W., Common, E. A., Sreckovic, M. A., Huber, H. B., Bottema-Beutel, K., Gustafson, J. R., Dykstra, J., & Hume, K. (2014). Promoting social competence and peer relationships for adolescents with autism spectrum disorders. *Remedial and Special Education, 35*(2), 91–101. https://doi.org/10.1177/0741932513514618

Carruthers, S., Pickles, A., Slonims, V., Howlin, P., & Charman, T. (2020). Beyond intervention into daily life: A systematic review of generalisation following social communication interventions for young children with autism. *Autism Research, 13*(4), 506–522. https://doi.org/10.1002/aur.2264

Chung, K. M., Chung, E., & Lee, H. (2024). Behavioral interventions for autism spectrum disorder: A brief review and guidelines with a specific focus on applied behavior analysis. *Journal of Child & Adolescent Psychiatry, 35*(1), 29–38. https://doi.org/10.5765/jkacap.230019

Chang, Y.-C., Shire, S. Y., Shih, W., Gelfand, C., & Kasari, C. (2016). Preschool deployment of evidence-based social communication intervention: JASPER in the classroom.

Journal of Autism and Developmental Disorders, 46, 2211–2223. https://doi.org/10.1007/s10803-016-2752-2

Charlop, M. H., Lang, R., & Rispoli, M. (2018). Conclusion: Play and social skills as behavioral cusps. In *Play and social skills for children with autism spectrum disorder* (pp. 155–162). Springer International Publishing. https://doi.org/10.1007/978-3-319-72500-0_9

Clarke, V., & Braun, V. (2016). Thematic analysis. *The Journal of Positive Psychology, 12*(3), 297–298. https://doi.org/10.1080/17439760.2016.1262613

Contreras, B. P., Hoffmann, A. N., & Slocum, T. A. (2022). Ethical behavior analysis: Evidence-based practice as a framework for ethical decision making. *Behavior Analysis in Practice, 15*(2), 619–634. https://doi.org/10.1007/s40617-021-00658-5

Cooper, M. (2022). Reducing special education costs by providing early intervention for autistic children. *Behavioral Interventions, 37*(2), 397–414. https://doi.org/10.1002/bin.1839

Cooper, J., Heron, T., & Heward, W. (2020). Part 7: Verbal behavior. In *Applied behavior analysis, global edition*. Pearson Education, Limited.

Cowan, R. J., & Allen, K. D. (2007). Using naturalistic procedures to enhance learning in individuals with autism: A focus on generalised teaching within the school setting. *Psychology in the Schools, 44*(7), 701–715. https://doi.org/10.1002/pits.20259

Crank, J. E., Sandbank, M., Dunham, K., Crowley, S., Bottema-Beutel, K., Feldman, J., & Woynaroski, T. G. (2021). Understanding the effects of naturalistic developmental behavioral interventions: A Project AIM meta-analysis. *Autism Research, 14*(4), 817–834. https://doi.org/10.1002/aur.2471

Creem, A. N., Rodriguez, K. A., Hillhouse, B. J., Lee, R., Leaf, J. B., & Matson, J. L. (2023). Early Intensive Behavioral Intervention for Autism Spectrum Disorder. In *Handbook of Clinical Child Psychology* (pp. 635–657). Springer International Publishing. https://doi.org/10.1007/978-3-031-24926-6_30

Cugmas, Z. (2011). Relation between children's attachment to kindergarten teachers, personality characteristics and play activities. *Early Child Development and Care*, *181*(9), 1271–1289. https://doi.org/10.1080/03004430.2010.523993

Dallman, A. R., Artis, J., Watson, L., & Wright, S. (2021). Systematic Review of Disparities and Differences in the Access and Use of Allied Health Services Amongst Children with Autism Spectrum Disorders. *Journal of Autism and Developmental Disorders*, *51*(4), 1316–1330. https://doi.org/10.1007/s10803-020-04608-y

DeGuzman, P. B., Abooali, S., Sadatsafavi, H., Bohac, G., & Sochor, M. (2024). Back to basics: Practical strategies to reduce sensory overstimulation in the emergency department identified by adults and caregivers of children with autism spectrum disorder. *International Emergency Nursing, 72,* 101384. https://doi.org/10.1016/j.ienj.2023.101384

De Korte, M. W. P., Kaijadoe, S. P. T., Buitelaar, J. K., Staal, W. G., & van Dongen-Boomsma, M. (2022). Pivotal response treatment (PRT) - parent group training for young children with autism spectrum disorder: A qualitative study on parents' perspectives. *Journal of Autism and Developmental Disorders, 52*(12), 5414–5427. https://doi.org/10.1007/s10803-021-05397-8

Deniz, E., Francis, G., Torgerson, C., Toseeb, U., & Didden, R. (2022). Parent-mediated play-based interventions to improve social communication and language skills of preschool

autistic children: A systematic review and meta-analysis protocol. *PLOS ONE, 17*(8), e0270153. https://doi.org/10.1371/journal.pone.0270153

Desha, L., Ziviani, J., & Rodger, S. (2003). Play preferences and behavior of preschool children with autistic spectrum disorder in the clinical environment. *Physical & Occupational Therapy in Pediatrics, 23*(1), 21–42. https://doi.org/10.1080/J006v23n01_03

Divan, G., Bhavnani, S., Leadbitter, K., Ellis, C., Dasgupta, J., Abubakar, A., Elsabbagh, M., Hamdani, S. U., Servili, C., Patel, V., & Green, J. (2021). Annual research review: Achieving universal health coverage for young children with autism spectrum disorder in low- and middle-income countries: A review of reviews. *Journal of Child Psychology and Psychiatry, 62*(5), 514–535. https://doi.org/10.1111/jcpp.13404

Dominguez, A., Ziviani, J., & Rodger, S. (2006). Play behaviours and play object preferences of young children with autistic disorder in a clinical play environment. *Autism: The International Journal of Research and Practice, 10*(1), 53–69. https://doi.org/10.1177/1362361306062010

Dorsey, M. F., & Harper, J. M. (2018). Toward the Scientist Practitioner Model in Applied Behavior Analysis: Examples of a Science-Based Practice. *Education & Treatment of Children*, *41*(3), 273–276. https://doi.org/10.1353/etc.2018.0013

Durkin, M. S., Elsabbagh, M., Barbaro, J., Gladstone, M., Happé, F., Hoekstra, R. A., Lee, L.-C., Rattazzi, A., Stapel-Wax, J., Stone, W. L., Tager-Flusberg, H., Thurm, A., Tomlinson, M., & Shih, A. (2015). Autism screening and diagnosis in low-resource settings: Challenges and opportunities to enhance research and services worldwide. *Autism Research, 8*(5), 473–476. https://doi.org/10.1002/aur.1575

Eckes, T., Buhlmann, U., Holling, H.-D., & Möllmann, A. (2023). Comprehensive ABA-based interventions in the treatment of children with autism spectrum disorder: A meta-analysis. *BMC Psychiatry, 23*(1). https://doi.org/10.1186/s12888-022-04412-1

Eikeseth, S., Smith, T., Jahr, E., & Eldevik, S. (2002). Intensive behavioral treatment at school for 4- to 7-year-old children with autism: A 1-year comparison controlled study. *Behaviour Modification, 26*(1), 49–68. https://doi.org/10.1177/0145445502026001004

Eldevik, S., Hastings, R. P., Hughes, J. C., Jahr, E., Eikeseth, S., & Cross, S. (2010). Using participant data to extend the evidence base for intensive behavioral intervention for children with autism. *American Journal on Intellectual and Developmental Disabilities, 115*(5), 381–405. https://doi.org/10.1352/1944-7558-115.5.381

Elbeltagi, R., Al-Beltagi, M., Saeed, N. K., & Alhawamdeh, R. (2023). Play therapy in children with autism: Its role, implications, and limitations. *World Journal of Clinical Pediatrics*, *12*(1), 1–22. https://doi.org/10.5409/wjcp.v12.i1.1

Fatta, L. M., Laugeson, E. A., Bianchi, D., Laghi, F., & Scattoni, M. L. (2024). Program for the Education and Enrichment of Relational Skills (PEERS) for Italy: A Randomized Controlled Trial of a Social Skills Intervention for Autistic Adolescents. *Journal of Autism and Developmental Disorders*. https://doi.org/10.1007/s10803-023-06211-3

Fava, L., & Strauss, K. (2014). Response to Early Intensive Behavioral Intervention for autism—An umbrella approach to issues critical to treatment individualization. International Journal of Developmental Neuroscience, 39(1), 49–58. https://doi.org/10.1016/j.ijdevneu.2014.05.004

Fein, R. H., Venta, A., Meinert, A. C., Mire, S. S., & Bergez, K. (2021). Autism Spectrum Disorder. In A. Venta, C. Sharp, J. M. Fletcher, & P. Fonagy (Eds.), Developmental Psychopathology (pp. 119-156). Wiley Blackwell.

Fingerhut, J., & Moeyaert, M. (2022). Training Individuals to Implement Discrete Trials with Fidelity: A Meta-Analysis. Focus on Autism and Other Developmental Disabilities, 37(4), 239–250. https://doi.org/10.1177/10883576221081076

Feliciano, P., Daniels, A. M., Esler, A., Gutierrez, A., Nicholson, A., Stephens, A. N., Stedman, A., Finucane, B., O'Roak, B. J., Robertson, B. E., Rodriguez, B., Van Metre, B., Bradley, C., Erickson, C. A., Harkins, C., Ochoa-Lubinoff, C., Rosenberg, C. R., Smith, C. J., Taylor, C. M., … Reichardt, L. F. (2018). SPARK: A US Cohort of 50,000 Families to Accelerate Autism Research. Neuron (Cambridge, Mass.), 97(3), 488–493. https://doi.org/10.1016/j.neuron.2018.01.015

Fromberg, D. P., & Bergen, D. (2015). *Play from Birth to Twelve: Contexts, Perspectives, and Meanings* (Third edition.). Routledge. https://doi.org/10.4324/9781315753201

Frye, R. E. (2018). Social Skills Deficits in Autism Spectrum Disorder: Potential Biological Origins and Progress in Developing Therapeutic Agents. CNS Drugs, 32(8), 713–734. https://doi.org/10.1007/s40263-018-0556-y

Fuller, E. A., Oliver, K., Vejnoska, S. F., & Rogers, S. J. (2020). The effects of the early start denver model for children with autism spectrum disorder: A meta-analysis. Brain Sciences, 10(6), 1–20. https://doi.org/10.3390/brainsci10060368

Fuller, E. A., & Kaiser, A. P. (2020). The Effects of Early Intervention on Social Communication Outcomes for Children with Autism Spectrum Disorder: A Meta-

analysis. *Journal of Autism and Developmental Disorders.*, *50*(5), 1683–1700. https://doi.org/10.1007/s10803-019-03927-z

Gallo-Lopez, L., & Rubin, L. C. (2012). *Play-based interventions for children and adolescents with autism spectrum disorders* (1st ed.). Routledge. https://doi.org/10.4324/9780203829134

Gantman, A., Kapp, S., Orenski, K., & Laugeson, E. (2012). Social skills training for young adults with high-functioning Autism Spectrum Disorders: A randomized controlled pilot study. Journal of Autism and Developmental Disorders, 42(6), 1094-1103. https://doi.org/10.1007/s10803-011-1350-6

Gibson, J. L., Pritchard, E., & de Lemos, C. (2021). Play-based interventions to support social and communication development in autistic children aged 2–8 years: A scoping review. Autism & Developmental Language Impairments, 6, 239694152110158–23969415211015840. https://doi.org/10.1177/23969415211015840

Godin, J., Freeman, A., & Rigby, P. (2019). Interventions to promote the playful engagement in social interaction of preschool-aged children with autism spectrum disorder (ASD): a scoping study. Early Child Development and Care, 189(10), 1666–1681. https://doi.org/10.1080/03004430.2017.1404999

Golan, O., Ashwin, E., Granader, Y., McClintock, S., Day, K., Leggett, V., & Baron-Cohen, S. (2010). Enhancing Emotion Recognition in Children with Autism Spectrum Conditions: An Intervention Using Animated Vehicles with Real Emotional Faces. *Journal of Autism and Developmental Disorders*, *40*(3), 269–279. https://doi.org/10.1007/s10803-009-0862-9

Graber, A., & Graber, J. (2023). Applied Behavior Analysis and the Abolitionist Neurodiversity Critique: An Ethical Analysis. Behaviour Analysis in Practice, 16(4), 921–937. https://doi.org/10.1007/s40617-023-00780-6

Gray, K. M., Keating, C. M., Taffe, J. R., Brereton, A. V., Einfeld, S. L., Reardon, T. C., & Tonge, B. J. (2014). Adult Outcomes in Autism: Community Inclusion and Living Skills. *Journal of Autism and Developmental Disorders.*, *44*(12), 3006–3015. https://doi.org/10.1007/s10803-014-2159-x

Greer, R. D. (2008). The ontogenetic selection of verbal capabilities: Contributions of Skinner's verbal behavior theory to a more comprehensive understanding of language. *Revista Internacional de Psicología y Terapia Psicológica*, *8*(3), 363–386.

Griffith, G. M., Totsika, V., Nash, S., & Hastings, R. P. (2012). 'I just do not fit anywhere': support experiences and future support needs of individuals with Asperger syndrome in middle adulthood. Autism : The International Journal of Research and Practice, 16(5), 532–546. https://doi.org/10.1177/1362361311405223

Grove, R., Roth, I., & Hoekstra, R. A. (2016). The motivation for special interests in individuals with autism and controls: Development and validation of the special interest motivation scale. *Autism Research*, *9*(6), 677–688. https://doi.org/10.1002/aur.1560

Guthrie, W., Swineford, L. B., Nottke, C., & Wetherby, A. M. (2013). Early diagnosis of autism spectrum disorder: stability and change in clinical diagnosis and symptom presentation. Journal of Child Psychology and Psychiatry, 54(5), 582–590. https://doi.org/10.1111/jcpp.12008

Hanley, G. P., Iwata, B. A., & McCord, B. E. (2003). Functional analysis of problem behavior: A review. *Journal of Applied Behavior Analysis, 36*(2), 147–185. https://doi.org/10.1901/jaba.2003.36-147

Hart Barnett, J. (2018). Three Evidence-Based Strategies that Support Social Skills and Play Among Young Children with Autism Spectrum Disorders. *Early Childhood Education Journal.*, *46*(6), 665–672. https://doi.org/10.1007/s10643-018-0911-0

Hashmi, S. (2023). How Do Children Play with Toy Trains and for What Benefits? A Scoping Review. European Journal of Investigation in Health, Psychology and Education, 13(10), 2112–2134. https://doi.org/10.3390/ejihpe13100149

Haq, S. S., & Aranki, J. (2019). Comparison of Traditional and Embedded DTT on Problem Behavior and Responding to Instructional Targets. Behaviour Analysis in Practice, 12(2), 396–400. https://doi.org/10.1007/s40617-018-00324-3

Helton, M. R., & Alber-Morgan, S. R. (2018). Helping Parents Understand Applied Behavior Analysis: Creating a Parent Guide in 10 Steps. Behaviour Analysis in Practice, 11(4), 496–503. https://doi.org/10.1007/s40617-018-00284-8

Henninger, N. A., & Taylor, J. L. (2013). Outcomes in adults with autism spectrum disorders: a historical perspective. Autism : The International Journal of Research and Practice, 17(1), 103–116. https://doi.org/10.1177/1362361312441266

Hobson, J. A., Hobson, R. P., Malik, S., Bargiota, K., & Caló, S. (2013). The relation between social engagement and pretend play in autism. *British Journal of Developmental Psychology*, *31*(1), 114–127. https://doi.org/10.1111/j.2044-835X.2012.02083.x

Hogan, A. J. (2019). Social and medical models of disability and mental health: evolution and renewal. *Canadian Medical Association Journal (CMAJ)*, *191*(1), E16–E18. https://doi.org/10.1503/cmaj.181008

Honan, I., Sharp, N., McIntyre, S., Smithers-Sheedy, H., Balde, I., Quinn, K., Morgan, M., Rothery, S., Butchers, T., & Laugeson, E. A. (2023). Program evaluation of an adapted PEERS® social skills program in young adults with autism spectrum disorder and/or mild intellectual impairment and social skills difficulties. Journal of Evaluation in Clinical Practice, 29(1), 126–135. https://doi.org/10.1111/jep.13743

Humphrey, N., & Lewis, S. (2008). Make me normal: The views and experiences of pupils on the autistic spectrum in mainstream secondary schools. Autism : The International Journal of Research and Practice, 12(1), 23–46. https://doi.org/10.1177/1362361307085267

Huntington, R. N., Badgett, N. M., Rosenberg, N. E., Greeny, K., Bravo, A., Bristol, R. M., Byun, Y. H., & Park, M. S. (2023). Social Validity in Behavioral Research: A Selective Review. *Perspectives on Behavior Science.*, *46*(1), 201–215. https://doi.org/10.1007/s40614-022-00364-9

Hu, X., Zheng, Q., & Lee, G. T. (2018). Using Peer-Mediated LEGO® Play Intervention to Improve Social Interactions for Chinese Children with Autism in an Inclusive Setting. Journal of Autism and Developmental Disorders, 48(7), 2444–2457. https://doi.org/10.1007/s10803-018-3502-4

Ingersoll, B., Lewis, E., & Kroman, E. (2007). Teaching the imitation and spontaneous use of descriptive gestures in young children with autism using a naturalistic behavioural

intervention. Journal of Autism and Developmental Disorders, 37(8), 1446–1456. https://doi.org/10.1007/s10803-006-0221-z

Ingersoll, B., Straiton, D., & Caquias, N. R. (2020). The Role of Professional Training Experiences and Manualized Programs in ABA Providers' Use of Parent Training With Children With Autism. *Behavior Therapy*, *51*(4), 588–600. https://doi.org/10.1016/j.beth.2019.09.004

Jang, J., Dixon, D. R., Tarbox, J., & Granpeesheh, D. (2011). Symptom severity and challenging behaviour in children with ASD. Research in Autism Spectrum Disorders, 5(3), 1028–1032. https://doi.org/10.1016/j.rasd.2010.11.008

Javed, H., Connor, O. B., & Cabibihan, J.-J. (2015). Thomas and friends: Implications for the design of social robots and their role as social story telling agents for children with autism. 2015 IEEE International Conference on Robotics and Biomimetics (ROBIO), 1145–1150. https://doi.org/10.1109/ROBIO.2015.7418926

Jensen, V. K., & Spannagel, S. C. (2011). The Spectrum of Autism Spectrum Disorder: A Spectrum of Needs, Services, and Challenges. *Journal of Contemporary Psychotherapy.*, *41*(1), 1–9. https://doi.org/10.1007/s10879-010-9161-1

Jepson, B., Granpeesheh, D., Tarbox, J., Olive, M. L., Stott, C., Braud, S., Yoo, J. H., Wakefield, A., & Allen, M. S. (2011). Controlled Evaluation of the Effects of Hyperbaric Oxygen Therapy on the Behavior of 16 Children with Autism Spectrum Disorders. Journal of Autism and Developmental Disorders, 41(5), 575–588. https://doi.org/10.1007/s10803-010-1075-y

Johnson, G., Kohler, K., & Ross, D. (2017). Contributions of Skinner's theory of verbal behaviour to language interventions for children with autism spectrum disorders. Early

Child Development and Care, 187(3-4), 436-446. https://doi.org/10.1080/03004430.2016.1236255

Kabashi, L., & Kaczmarek, L. A. (2017). Evaluating the Efficacy of Video-Based Instruction (VBI) on Improving Social Initiation Skills of Children with Autism Spectrum Disorder (ASD): A Review of Literature. *Review Journal of Autism and Developmental Disorders.*, *4*(1), 61–81. https://doi.org/10.1007/s40489-016-0098-5

Katz, E., & Girolametto, L. (2013). Peer-Mediated Intervention for Preschoolers With ASD Implemented in Early Childhood Education Settings. *Topics in Early Childhood Special Education*, *33*(3), 133–143. https://doi.org/10.1177/0271121413484972

Keating, C. T., Hickman, L., Leung, J., Monk, R., Montgomery, A., Heath, H., & Sowden, S. (2023). Autism-related language preferences of English-speaking individuals across the globe: A mixed methods investigation. *Autism Research*, *16*(2), 406–428. https://doi.org/10.1002/aur.2864

Klintwall, L., Eldevik, S., & Eikeseth, S. (2015). Narrowing the gap: Effects of intervention on developmental trajectories in autism. *Autism : The International Journal of Research and Practice*, *19*(1), 53–63. https://doi.org/10.1177/1362361313510067

Koegel, L. K., Bryan, K. M., Su, P. L., Vaidya, M., & Camarata, S. (2020). Definitions of Nonverbal and Minimally Verbal in Research for Autism: A Systematic Review of the Literature. *Journal of Autism and Developmental Disorders.*, *50*(8), 2957–2972. https://doi.org/10.1007/s10803-020-04402-w

Koegel, L. K., Koegel, R. L., Ashbaugh, K., & Bradshaw, J. (2014). The importance of early identification and intervention for children with or at risk for autism spectrum

disorders. *International Journal of Speech-Language Pathology.*, *16*(1), 50–56. https://doi.org/10.3109/17549507.2013.861511

Koegel, L. K., Koegel, R. L., Green-Hopkins, I., & Barnes, C. C. (2010). Brief Report: Question-Asking and Collateral Language Acquisition in Children with Autism. Journal of Autism and Developmental Disorders, 40(4), 509–515. https://doi.org/10.1007/s10803-009-0896-z

Koegel, L. K., Koegel, R. L., Harrower, J. K., & Carter, C. M. (1999). Pivotal Response Intervention I: Overview of Approach. Journal of the Association for Persons with Severe Handicaps, 24(3), 174–185. https://doi.org/10.2511/rpsd.24.3.174

Kornack, J., Persicke, A., Cervantes, P., Jang, J., & Dixon, D. (2014). Economics of Autism Spectrum Disorders: An Overview of Treatment and Research Funding. In *Handbook of Early Intervention for Autism Spectrum Disorders : Research, Policy, and Practice* / (pp. 165–178). Springer New York : https://doi.org/10.1007/978-1-4939-0401-3_9

Langford, P. (2005). Vygotsky's developmental and educational psychology (1st edition.). Psychology Press. https://doi.org/10.4324/9780203499573

Leaf, J. B., Cihon, J. H., Ferguson, J. L., Milne, C. M., Leaf, R., & McEachin, J. (2021). Advances in Our Understanding of Behavioral Intervention: 1980 to 2020 for Individuals Diagnosed with Autism Spectrum Disorder. Journal of Autism and Developmental Disorders, 51(12), 4395–4410. https://doi.org/10.1007/s10803-020-04481-9

Leaf, J. B., Leaf, R., McEachin, J., Taubman, M., Ala'i-Rosales, S., Ross, R. K., Smith, T., & Weiss, M. J. (2016). Applied Behavior Analysis is a Science and, Therefore,

Progressive. *Journal of Autism and Developmental Disorders*, *46*(2), 720–731. https://doi.org/10.1007/s10803-015-2591-6

Lee, G. T., Jiang, Y., & Hu, X. (2023). Improving Social Interactions for Young Children on the Autism Spectrum Through Parent-Mediated LEGO Play Activities. Remedial and Special Education, 44(6), 457–468. https://doi.org/10.1177/07419325221147699

LeGoff, D. B. (2004). Use of LEGO© as a therapeutic medium for improving social competence. Journal of Autism and Developmental Disorders, 34(5), 557–571. https://doi.org/10.1007/s10803-004-2550-0

Lei, J., & Ventola, P. (2017). Pivotal response treatment for autism spectrum disorder: current perspectives. *Neuropsychiatric Disease and Treatment.*, *Volume 13*, 1613–1626. https://doi.org/10.2147/NDT.S120710

Levy, J., & Dunsmuir, S. (2020). Lego therapy: Building social skills for adolescents with an autism spectrum disorder. *Educational and Child Psychology*, *37*(1), 58–83. https://doi.org/10.53841/bpsecp.2020.37.1.58

López-Romero, L., Romero, E., & Andershed, H. (2015). Conduct Problems in Childhood and Adolescence: Developmental Trajectories, Predictors and Outcomes in a Six-Year Follow Up. *Child Psychiatry and Human Development.*, *46*(5), 762–773. https://doi.org/10.1007/s10578-014-0518-7

Lovaas, O. I. (1987). Behavioural Treatment and Normal Educational and Intellectual Functioning in Young Autistic Children. Journal of Consulting and Clinical Psychology, 55(1), 3–9. https://doi.org/10.1037/0022-006X.55.1.3

MacCormack, J. W. H., Matheson, I. A., & Hutchinson, N. L. (2015). An exploration of a community-based lego® social-skills program for youth with autism spectrum

disorder. *Exceptionality Education International*, *25*(3), 13–32. https://doi.org/10.5206/eei.v25i3.7729

MacLennan, K., Woolley, C., Andsensory, E., Heasman, B., Starns, J., George, B., & Manning, C. (2023). “It Is a Big Spider Web of Things”: Sensory Experiences of Autistic Adults in Public Spaces. *Autism in Adulthood*, *5*(4), 411–422. https://doi.org/10.1089/aut.2022.0024

Makrygianni, M. K., & Reed, P. (2010). A meta-analytic review of the effectiveness of behavioural early intervention programs for children with Autistic Spectrum Disorders. Research in Autism Spectrum Disorders, 4(4), 577–593. https://doi.org/10.1016/j.rasd.2010.01.014

Mandecka, A., & Regulska-Ilow, B. (2022). The importance of nutritional management and education in the treatment of autism. *Roczniki Państwowego Zakładu Higieny, 73*(3).

Matson, J. L. (Ed.). (2017). Handbook of Treatments for Autism Spectrum Disorder (1st ed. 2017.). Springer International Publishing. https://doi.org/10.1007/978-3-319-61738-1

McConkey, R., Cassin, M. T., McNaughton, R., & Armstrong, E. (2021). Enhancing the social networks of adults with ASD: a low level community intervention. Advances in Autism, 7(4), 322–334. https://doi.org/10.1108/AIA-07-2020-0043

McGrew, J. H., Ruble, L. A., & Smith, I. M. (2016). Autism Spectrum Disorder and Evidence-Based Practice in Psychology. *Clinical Psychology (New York, N.Y.)*, *23*(3), 239–255. https://doi.org/10.1111/cpsp.12160

Milton, B., Attree, P., French, B., Povall, S., Whitehead, M., & Popay, J. (2012). The impact of community engagement on health and social outcomes: a systematic review. *Community Development Journal.*, *47*(3), 316–334. https://doi.org/10.1093/cdj/bsr043

Mitchell, S., Cardy, J. O., & Zwaigenbaum, L. (2011). Differentiating Autism Spectrum Disorder From Other Developmental Delays In The First Two Years Of Life. *Developmental Disabilities Research Reviews.*, *17*(2), 130–140. https://doi.org/10.1002/ddrr.1107

Mundy, P., & Jarrold, W. (2010). Infant joint attention, neural networks and social cognition. *Neural Networks*, *23*(8), 985–997. https://doi.org/10.1016/j.neunet.2010.08.009

Nagin, D. S. (1999). Analyzing developmental trajectories: A semiparametric, group-based approach. *Psychological Methods.*, *4*(2), 139–157. https://doi.org/10.1037/1082-989X.4.2.139

Narzisi, A., Sesso, G., Berloffa, S., Fantozzi, P., Muccio, R., Valente, E., Viglione, V., Villafranca, A., Milone, A., & Masi, G. (2021). Could you give me the blue brick? Lego®-based therapy as a social development program for children with autism spectrum disorder: A systematic review. Brain Sciences, 11(6), 702-. https://doi.org/10.3390/brainsci11060702

Nassar, N., Dixon, G., Bourke, J., Bower, C., Glasson, E., De Klerk, N., & Leonard, H. (2009). Autism spectrum disorders in young children: effect of changes in diagnostic practices. *International journal of epidemiology*, *38*(5), 1245-1254.

Neal, J. W., Neal, Z. P., & Durbin, C. E. (2022). Inferring signed networks from preschoolers' observed parallel and social play. *Social Networks*, *71*, 80–86. https://doi.org/10.1016/j.socnet.2022.07.002

Neely, L. C., Ganz, J. B., Davis, J. L., Boles, M. B., Hong, E. R., Ninci, J., & Gilliland, W. D. (2016). Generalization and Maintenance of Functional Living Skills for Individuals

with Autism Spectrum Disorder: a Review and Meta-Analysis. Review Journal of Autism and Developmental Disorders, 3(1), 37–47. https://doi.org/10.1007/s40489-015-0064-7

NZ Herald. (2024, December 3). *Group a chance to build spacecrafts and friendships*. NZ Herald. https://www.nzherald.co.nz/nz/group-a-chance-to-build-spacecrafts-and-friendships/SQV4WLE3PVU42ZYGIGY6JSBRIY/

Orsmond, G. I., Krauss, M. W., & Seltzer, M. M. (2004). Peer Relationships and Social and Recreational Activities Among Adolescents and Adults with Autism. Journal of Autism and Developmental Disorders., 34(3), 245–256. https://doi.org/10.1023/B:JADD.0000029547.96610.df

O'Nions, E., Ceulemans, E., Happé, F., Benson, P., Evers, K., & Noens, I. (2020). Parenting Strategies Used by Parents of Children with ASD: Differential Links with Child Problem Behaviour. *Journal of Autism and Developmental Disorders*, *50*(2), 386–401. https://doi.org/10.1007/s10803-019-04219-2

O'Nions, E., Happé, F., Evers, K., Boonen, H., & Noens, I. (2018). How do Parents Manage Irritability, Challenging Behaviour, Non-Compliance and Anxiety in Children with Autism Spectrum Disorders? A Meta-Synthesis. *Journal of Autism and Developmental Disorders*, *48*(4), 1272–1286. https://doi.org/10.1007/s10803-017-3361-4

Pacia, C., Holloway, J., Gunning, C., & Lee, H. (2022). A Systematic Review of Family-Mediated Social Communication Interventions for Young Children with Autism. *Review Journal of Autism and Developmental Disorders.*, *9*(2), 208–234. https://doi.org/10.1007/s40489-021-00249-8

Paul, R., Campbell, D., Gilbert, K., & Tsiouri, I. (2013). Comparing Spoken Language Treatments for Minimally Verbal Preschoolers with Autism Spectrum Disorders. Journal of Autism and Developmental Disorders, 43(2), 418–431. https://doi.org/10.1007/s10803-012-1583-z

Pelaez, M., & Novak, G. (2024). Language development and behavioral systems. *The Psychological Record.* https://doi.org/10.1007/s40732-023-00578-6

Pinquart, M., & Dubow, E. F. (2017). Associations of Parenting Dimensions and Styles With Externalizing Problems of Children and Adolescents: An Updated Meta-Analysis. *Developmental Psychology*, *53*(5), 873–932. https://doi.org/10.1037/dev0000295

Pires, J. F., Grattão, C. C., & Gomes, R. M. R. (2024). The challenges for early intervention and its effects on the prognosis of autism spectrum disorder: a systematic review. *Dementia & Neuropsychologia*, *18*, e20230034–e20230034. https://doi.org/10.1590/1980-5764-DN-2023-0034

Pisula, E. (2021). Empirical evaluation of the association between daily living skills of adults with autism and parental caregiver burden. *PLOS ONE, 16*(1). https://doi.org/10.1371/journal.pone.0244844

Podgórska-Bednarz, J., & Perenc, L. (2021). Hyperbaric Oxygen Therapy for Children and Youth with Autism Spectrum Disorder: A Review. *Brain Sciences.*, *11*(7). https://doi.org/10.3390/brainsci11070916

Politte, L. C., Howe, Y., Nowinski, L., Palumbo, M., & McDougle, C. J. (2015). Evidence-Based Treatments for Autism Spectrum Disorder. *Current Treatment Options in Psychiatry*, *2*(1), 38–56. https://doi.org/10.1007/s40501-015-0031-z

Pollard, N., & Carver, N. (2016). Building model trains and planes: An autoethnographic investigation of a human occupation. Journal of Occupational Science, 23(2), 168–180. https://doi.org/10.1080/14427591.2016.1153509

Posselt, V. (2023, September 28). *Another train of thought*. Cambridge News. https://www.cambridgenews.nz/2023/09/another-train-of-thought/

Potvin, M.-C., Snider, L., Prelock, P., Kehayia, E., & Wood-Dauphinee, S. (2013). Recreational Participation of Children with High Functioning Autism. *Journal of Autism and Developmental Disorders.*, *43*(2), 445–457. https://doi.org/10.1007/s10803-012-1589-6

Reed, P., Osborne, L. A., & Corness, M. (2007). Brief report: Relative effectiveness of different home-based behavioural approaches to early teaching intervention. Journal of Autism and Developmental Disorders, 37(9), 1815–1821. https://doi.org/10.1007/s10803-006-0306-8

Reichow, B., Barton, E. E., Boyd, B. A., & Hume, K. (2014). Early intensive behavioral intervention (EIBI) for young children with autism spectrum disorders (ASD): A systematic review. *Campbell Systematic Reviews*, 10(1), 1–116. https://doi.org/10.4073/csr.2014.9

Roane, H. S., Fisher, W. W., & Carr, J. E. (2016). Applied Behavior Analysis as Treatment for Autism Spectrum Disorder. The Journal of Pediatrics, 175, 27–32. https://doi.org/10.1016/j.jpeds.2016.04.023

Robertson, A. E., & Simmons, D. R. (2013). The Relationship between Sensory Sensitivity and Autistic Traits in the General Population. Journal of Autism and Developmental Disorders, 43(4), 775–784. https://doi.org/10.1007/s10803-012-1608-7

Rodgers, M., Simmonds, M., Marshall, D., Hodgson, R., Stewart, L. A., Rai, D., Wright, K., Ben-Itzchak, E., Eikeseth, S., Eldevik, S., Kovshoff, H., Magiati, I., Osborne, L. A., Reed, P., Vivanti, G., Zachor, D., & Couteur, A. L. (2021). Intensive behavioural interventions based on applied behaviour analysis for young children with autism: An international collaborative individual participant data meta-analysis. *Autism : The International Journal of Research and Practice*, *25*(4), 1137–1153. https://doi.org/10.1177/1362361320985680

Rogers, S. J., Estes, A., Vismara, L., Munson, J., Zierhut, C., Greenson, J., Dawson, G., Rocha, M., Sugar, C., Senturk, D., Whelan, F., & Talbott, M. (2019). Enhancing Low-Intensity Coaching in Parent Implemented Early Start Denver Model Intervention for Early Autism: A Randomized Comparison Treatment Trial. Journal of Autism and Developmental Disorders, 49(2), 632–646. https://doi.org/10.1007/s10803-018-3740-5

Saggers, B., Ashburner, J., Willis, J., Franz, J., & Hughes, H. (2019). Creating learning spaces that promote wellbeing, participation, and engagement: Implications for students on the autism spectrum. In *School spaces for student wellbeing and learning* (pp. 139–156). Springer. https://doi.org/10.1007/978-981-13-6092-3_8

Salter, K., Beamish, W., & Davies, M. (2016). The Effects of Child-Centered Play Therapy (CCPT) on the Social and Emotional Growth of Young Australian Children With Autism. *International Journal of Play Therapy*, *25*(2), 78–90. https://doi.org/10.1037/pla0000012

Sandbank, M., Bottema-Beutel, K., Crowley, S., Cassidy, M., Dunham, K., Feldman, J. I., Crank, J., Albarran, S. A., Raj, S., Mahbub, P., Woynaroski, T. G., Albarracín, D., & Johnson, B. T. (2020). Project AIM: Autism Intervention Meta-Analysis for Studies of

Young Children. *Psychological Bulletin*, *146*(1), 1–29. https://doi.org/10.1037/bul0000215

Schohl, K. A., Van Hecke, A. V., Carson, A. M., Dolan, B., Karst, J., & Stevens, S. (2014). A Replication and Extension of the PEERS Intervention: Examining Effects on Social Skills and Social Anxiety in Adolescents with Autism Spectrum Disorders. Journal of Autism and Developmental Disorders, 44(3), 532–545. https://doi.org/10.1007/s10803-013-1900-1

Schreibman, L., Dawson, G., Stahmer, A. C., Landa, R., Rogers, S. J., McGee, G. G., Kasari, C., Ingersoll, B., Kaiser, A. P., Bruinsma, Y., McNerney, E., Wetherby, A., & Halladay, A. (2015). Naturalistic Developmental Behavioral Interventions: Empirically Validated Treatments for Autism Spectrum Disorder. Journal of Autism and Developmental Disorders, 45(8), 2411–2428. https://doi.org/10.1007/s10803-015-2407-8

Searing, B. M. J., Graham, F., & Grainger, R. (2015). Support Needs of Families Living with Children with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*, *45*(11), 3693–3702. https://doi.org/10.1007/s10803-015-2516-4

Schwartz, I. S., & Baer, D. M. (1991). Social validity assessments: Is current practice state of the art? *Journal of Applied Behavior Analysis, 24*(2), 189–204. https://doi.org/10.1901/jaba.1991.24-189

Schwartz, L., Beamish, W., & McKay, L. (2021). Understanding social-emotional reciprocity in autism: Viewpoints shared by teachers. *The Australian Journal of Teacher Education, 46*(1), 24–38. https://doi.org/10.14221/ajte.202v46n1.2

Shafer, E. (1995). A review of interventions to teach a mand repertoire. *The Analysis of Verbal Behavior*, *12*(1), 53–66. https://doi.org/10.1007/BF03392897

Shattuck, P. T., Lau, L., Anderson, K. A., & Kuo, A. A. (2018). A national research agenda for the transition of youth with autism. *Pediatrics, 141*(Supplement_4), S355–S361.

Sherratt, D. (2002). Developing pretend play in children with autism: A case study. *Autism: The International Journal of Research and Practice, 6*(2), 169–179. https://doi.org/10.1177/1362361302006002004

Shih, W., Shire, S., Chang, Y., & Kasari, C. (2021). Joint engagement is a potential mechanism leading to increased initiations of joint attention and downstream effects on language: JASPER early intervention for children with ASD. *Journal of Child Psychology and Psychiatry, 62*(10), 1228–1235. https://doi.org/10.1111/jcpp.13405

Shire, S. Y., Chang, Y., Shih, W., Bracaglia, S., Kodjoe, M., & Kasari, C. (2017). Hybrid implementation model of community-partnered early intervention for toddlers with autism: a randomized trial. *Journal of Child Psychology and Psychiatry*, *58*(5), 612–622. https://doi.org/10.1111/jcpp.12672

Shyman, E. (2016). The reinforcement of ableism: Normality, the medical model of disability, and humanism in applied behaviour analysis and ASD. *Intellectual and Developmental Disabilities, 54*(5), 366–376. https://doi.org/10.1352/1934-9556-54.5.366

Silveira-Zaldivara, T. (2021). Developing social skills and social competence in children with autism. *International Electronic Journal of Elementary Education, 13*(3), 341–363. https://doi.org/10.26822/iejee.2021.195

Sivaraman, M., & Fahmie, T. A. (2018). Using common interests to increase socialization between children with autism and their peers. *Research in Autism Spectrum Disorders, 51*, 1–8. https://doi.org/10.1016/j.rasd.2018.03.007

Skinner, B. F. (1938). The behavior of organisms: An experimental analysis. Oxford, UK: Appleton-Century.

Skinner, B. F. (1957). *Verbal behavior*. New York, NY: Appleton-Century-Croft.

Smith, I. M., & MacDonald, N. E. (2017). Countering evidence denial and the promotion of pseudoscience in autism spectrum disorder. *Autism Research, 10*(8), 1334–1337. https://doi.org/10.1002/aur.1810

Smith, T., & Iadarola, S. (2015). Evidence base update for autism spectrum disorder. *Journal of Clinical Child and Adolescent Psychology, 44*(6), 897–922. https://doi.org/10.1080/15374416.2015.1077448

Spain, D., & Blainey, S. H. (2015). Group social skills interventions for adults with high-functioning autism spectrum disorders: A systematic review. *Autism : The International Journal of Research and Practice*, *19*(7), 874–886. https://doi.org/10.1177/1362361315587659

Strauss, K., Mancini, F., & Fava, L. (2013). Parent inclusion in early intensive behaviour interventions for young children with ASD: A synthesis of meta-analyses from 2009 to 2011. *Research in Developmental Disabilities, 34*(9), 2967–2985. https://doi.org/10.1016/j.ridd.2013.06.007

Swan, A. J., Carper, M. M., & Kendall, P. C. (2016). In pursuit of generalization: An updated review. *Behavior Therapy, 47*(5), 733–746. https://doi.org/10.1016/j.beth.2015.11.006

Taylor, B. A., & DeQuinzio, J. A. (2012). Observational Learning and Children With Autism. *Behavior Modification*, *36*(3), 341–360. https://doi.org/10.1177/0145445512443981

Thabrew, H., & Eggleston, M. (2018). Spectrum of care: Current management of childhood autism spectrum disorder (ASD) in New Zealand. *Australasian Psychiatry: Bulletin of the Royal Australian and New Zealand College of Psychiatrists, 26*(3), 294–298. https://doi.org/10.1177/1039856217716290

Thomas, N., & Smith, C. (2004). Developing play skills in children with autistic spectrum disorders. *Educational Psychology in Practice, 20*(3), 195–206. https://doi.org/10.1080/0266736042000251781

Thorndike, E. L. (1933). A proof of the law of effect. *Science (American Association for the Advancement of Science), 77*(1989), 173–175. https://doi.org/10.1126/science.77.1989.173-bb

Tiede, G., & Walton, K. M. (2019). Meta-analysis of naturalistic developmental behavioural interventions for young children with autism spectrum disorder. Autism : The International Journal of Research and Practice, 23(8), 2080–2095. https://doi.org/10.1177/1362361319836371

Timmons, J., Zalewska, A., Hall, A. C., & Fesko, S. (2017). Exploring the impact of community service on career exploration, self-determination, and social skills for transition-age youth with autism spectrum disorders. *Inclusion (Washington, D.C.), 5*(1), 16–32. https://doi.org/10.1352/2326-6988-5.1.16

Tobin, M. C., Drager, K. D. R., & Richardson, L. F. (2014). A systematic review of social participation for adults with autism spectrum disorders: Support, social functioning,

and quality of life. Research in Autism Spectrum Disorders, 8(3), 214–229. https://doi.org/10.1016/j.rasd.2013.12.002

Uljarević, M., Billingham, W., Cooper, M. N., Condron, P., & Hardan, A. Y. (2022). Examining Effectiveness and Predictors of Treatment Response of Pivotal Response Treatment in Autism: An Umbrella Review and a Meta-Analysis. Frontiers in Psychiatry, 12, 766150–766150. https://doi.org/10.3389/fpsyt.2021.766150

Vargas, E. A. (2013). The Importance of Form in Skinner's Analysis of Verbal Behavior and a Further Step. The Analysis of Verbal Behavior, 29(1), 167–183. https://doi.org/10.1007/BF03393133

Veraksa, A. N., Veresov, N. N., Sukhikh, V. L., Gavrilova, M. N., & Plotnikova, V. A. (2024). Play to Foster Children's Executive Function Skills: Exploring Short-and Long-Term Effects of Digital and Traditional Types of Play. *International Journal of Early Childhood*, *56*(3), 687–709. https://doi.org/10.1007/s13158-023-00377-8

Venturini, E., & Parsons, T. D. (2018). Virtual Environments for Assessment of Social Exclusion in Autism: a Systematic Review. *Review Journal of Autism and Developmental Disorders.*, *5*(4), 408–421. https://doi.org/10.1007/s40489-018-0149-1

Verschuur, R., Didden, R., Lang, R., Sigafoos, J., & Huskens, B. (2014). Pivotal Response Treatment for Children with Autism Spectrum Disorders: A Systematic Review. *Review Journal of Autism and Developmental Disorders*, *1*(1), 34–61. https://doi.org/10.1007/s40489-013-0008-z

Vismara, L. A., Colombi, C., & Rogers, S. J. (2009). Can one hour per week of therapy lead to lasting changes in young children with autism? Autism : The International Journal of Research and Practice, 13(1), 93–115. https://doi.org/10.1177/1362361307098516

Vivanti, G., & Rogers, S. J. (2014). Autism and the mirror neuron system: insights from learning and teaching. *Philosophical Transactions of the Royal Society of London. Series B. Biological Sciences*, *369*(1644), 20130184–20130184. https://doi.org/10.1098/rstb.2013.0184

Vivanti, G. (2020). Autism and autism treatment: Evolution of concepts and practices from Kanner to contemporary approaches. In G. Vivanti, K. Bottema-Beutel, & L. Turner-Brown (Eds.), *Clinical guide to early interventions for children with autism* (pp. 1–7). Springer, Cham. https://doi-org.ezproxy.waikato.ac.nz/10.1007/978-3-030-41160-2_1

Vivanti, G. (2023). Kasari et al.: The JASPER Model for Children with Autism: Promoting Joint Attention, Symbolic Play, Engagement, and Regulation. Guilford Publications [Review of Kasari et al.: The JASPER Model for Children with Autism: Promoting Joint Attention, Symbolic Play, Engagement, and Regulation. Guilford Publications]. Journal of Autism and Developmental Disorders, 53(5), 2166–2167. Springer US. https://doi.org/10.1007/s10803-022-05485-3

Waddington, H., Minnell, H., Patrick, L., van Der Meer, L., Monk, R., Woods, L., & Whitehouse, A. J. (2024). Community perspectives on the appropriateness and importance of support goals for young autistic children. Autism : The International Journal of Research and Practice, 28(2), 316–326. https://doi.org/10.1177/13623613231168920

Walsh, E., Holloway, J., & Lydon, H. (2018). An evaluation of a social skills intervention for adults with autism spectrum disorder and intellectual disabilities preparing for employment in Ireland: A pilot study. Journal of Autism and Developmental Disorders, 48(5), 1727-1741. https://doi.org/10.1007/s10803-017-3441-5

Wang, H., Zhao, X., & Yu, D. (2023). Nonlinear features of gaze behavior during joint attention in children with autism spectrum disorder. *Autism Research*, *16*(9), 1786–1798. https://doi.org/10.1002/aur.3000

Wetherby, A. M., Woods, J., Guthrie, W., Delehanty, A., Brown, J. A., Morgan, L., Holland, R. D., Schatschneider, C., & Lord, C. (2018). Changing developmental trajectories of toddlers with autism spectrum disorder: Strategies for bridging research to community practice. *Journal of Speech, Language, and Hearing Research*, *61*(11), 2615–2628. https://doi.org/10.1044/2018_JSLHR-L-RSAUT-18-0028

Whaikaha – Ministry of Disabled People, & Ministry of Education. (2022). *Aotearoa New Zealand autism guideline: He waka huia takiwātanga rau: Third edition*. https://www.whaikaha.govt.nz/assets/Autism-Guideline/Aotearoa-New-Zealand-Autism-Guideline-Third-Edition.pdf

Whitaker, S. (2002). Maintaining Reductions in Challenging Behaviours: A Review of the Literature. The British Journal of Developmental Disabilities, 48(94), 15–25. https://doi.org/10.1179/096979502799104292

Williams, E., Reddy, V., & Costall, A. (2001). Taking a Closer Look at Functional Play in Children with Autism. Journal of Autism and Developmental Disorders, 31(1), 67–77. https://doi.org/10.1023/A:1005665714197

Winder, B. M., Wozniak, R. H., Parladé, M. V., & Iverson, J. M. (2013). Spontaneous Initiation of Communication in Infants at Low and Heightened Risk for Autism Spectrum Disorders. Developmental Psychology, 49(10), 1931–1942. https://doi.org/10.1037/a0031061

Wolf, M. M. (1978). Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis, 11*(2), 203–214. https://doi.org/10.1901/jaba.1978.11-203

Wolfberg, P., DeWitt, M., Young, G. S., & Nguyen, T. (2015). Integrated Play Groups: Promoting Symbolic Play and Social Engagement with Typical Peers in Children with ASD Across Settings. *Journal of Autism and Developmental Disorders*, *45*(3), 830–845. https://doi.org/10.1007/s10803-014-2245-0

Wong, C., Odom, S. L., Hume, K. A., Cox, A. W., Fettig, A., Kucharczyk, S., Brock, M. E., Plavnick, J. B., Fleury, V. P., & Schultz, T. R. (2015). Evidence-Based Practices for Children, Youth, and Young Adults with Autism Spectrum Disorder: A Comprehensive Review. *Journal of Autism and Developmental Disorders*, *45*(7), 1951–1966. https://doi.org/10.1007/s10803-014-2351-z

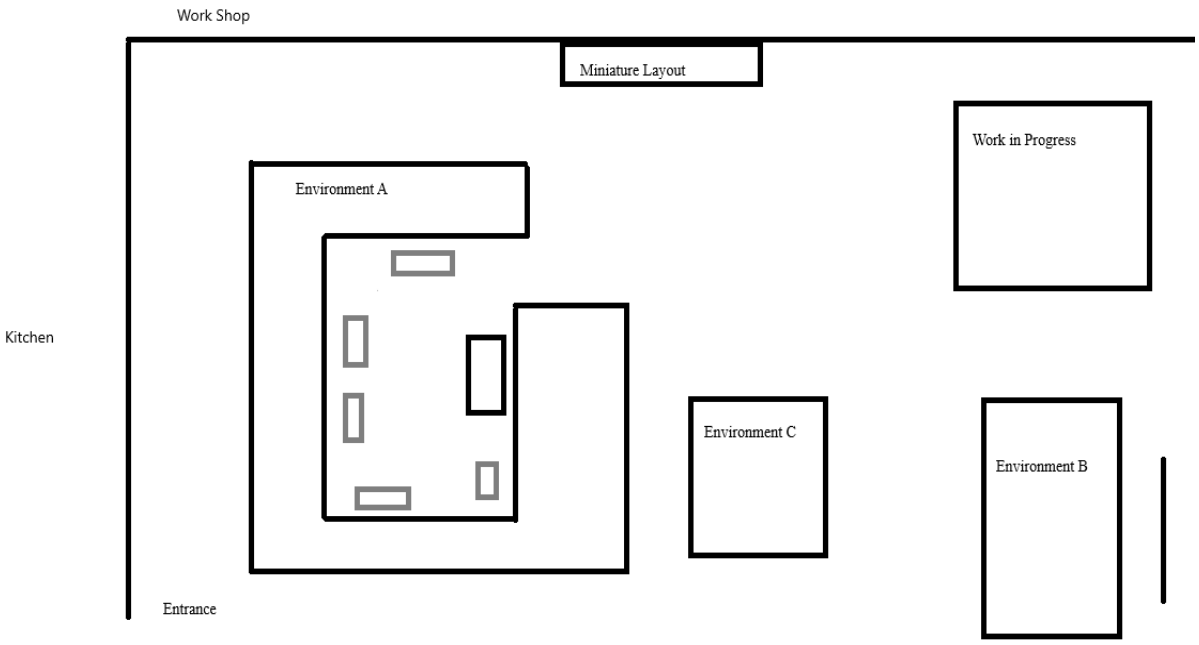
World Health Organization. (2023). *Autism spectrum disorders*. World Health Organization. https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders

Wyman, J., & Claro, A. (2020). The UCLA PEERS School-Based Program: Treatment Outcomes for Improving Social Functioning in Adolescents and Young Adults with Autism Spectrum Disorder and Those with Cognitive Deficits. Journal of Autism and Developmental Disorders, 50(6), 1907–1920. https://doi.org/10.1007/s10803-019-03943-z

Yu, Q., Li, E., Li, L., & Liang, W. (2020). Efficacy of interventions based on applied behaviour analysis for autism spectrum disorder: A meta-analysis. Psychiatry Investigation, 17(5), 432–443. https://doi.org/10.30773/pi.2019.0229

Zwilling, M., & Levy, B. R. (2022). How Well Environmental Design Is and Can Be Suited to People with Autism Spectrum Disorder (ASD): A Natural Language Processing Analysis. *International Journal of Environmental Research and Public Health*, *19*(9), 5037-. https://doi.org/10.3390/ijerph19095037

Appendix A- Clubroom layout



Appendix B- Poster

Appendix C- Attendance Table

Date	Time/ Number							AVG

Appendix D- Group 1 Observation Data Recording Sheet

Enviro A

Interaction w/ trains																			

Soc Inter																			

Enviro B

Interaction w/ trains																			

Soc Inter																			

Enviro C

Interaction w/ trains																			

Soc Inter																			

Code
Child initiates interaction with adult- C>A
Child initiates interaction with volunteer- C>A
Adult initiates interaction with child- C<A
Volunteer initiates interaction with chill C<V
Child interacts with another child- C

Appendix E- Group 2 Observation Data Recording Sheet

Joint attention																			
Soc Inter																			
Int w/ Trains																			
Parallel play																			
sharing																			

KEY
Environment- A, B, C

TC pointing Joint attention	TC following
JA>A- adult	JA<A- adult
JA>C- child	JA<C- child
JA>V- volunteer	JA<V- volunteer

TC initiating SI Social interaction	Other initiating SI
SI>A- adult	SI<A- adult
SI>C- child	SI<C- child
SI>V- volunteer	SI<V- volunteer

TC initiating SH sharing	Other initiating SH
SH>A- adult	SH<A- adult
SH>C- child	SH<C- child
SH>V- volunteer	SH<V- volunteer

Appendix F- Group 1 Interview Questions

Question number	Short response
1 do you come here often?	
2 why do you like coming here?	
3 what benefits do you think this facility has?	
4 are you happy to tell me a little bit about yourself?	
5 do you live locally?	
6 are any of your children neurodivergent? Do they have a disability?	
7 would you be willing to participate in an in-depth case study?	

Appendix G- Group 2 Interview Questions

Question	Answer
How many children do you have and what are their ages?	
Would you say your child is neurodivergent?	
If so why is that?	
Do they have or are waiting on a diagnosis?	
If so what is the diagnosis?	
By whom and when were they diagnosed?	
Do they receive any additional help/ intervention/ attend a different school?	
What is your child's biggest need/ your greatest concern?	

Appendix H- Focus Group Conversation Starters

- How long have you been interested in model trains?
- What aspects of them pique your interest?
- Do you enjoy teaching the children how to use them?
- How do you teach them how to use the trains?
- Do any of the kids ask questions? If so, what are these questions like?
- What role do the parents play?
- What does being in this group of people make you feel?
- What are the benefits you have noticed from participating in this club?
- What benefits have you seen for others when visiting this club?
- Have you made any close friendships or bonds due to this club?
- Is there anything else you would like to mention that we have not asked?

Appendix I- Group 2 Information Sheet

Participant Information Sheet Group 2

Dr Angelika Anderson School of Psychology The University of Waikato Phone: 07 838 4466 ext 9209 Email: angelika@waikato.ac.nz	Tamara Geary Email: tg90@students.waikato.ac.nz Jacob Gedye Email: jg311@students.waikato.ac.nz

Project title: Preliminary evaluation of a model train community initiative

Dear public of the Greater Waikato Railway Modellers (GWRM)
We are doing a research project investigating the impact of the model railway programme. We (Jacob Gedye; Tamara Geary) are two master's students at the University of Waikato, supervised by Dr Angelika Anderson. This research will be used to write our masters' theses. Please read this information sheet so that you can decide whether you would like to participate.

What is this research about?
We were invited by Paul Murphy to conduct this research project. Our aim is to describe the model railway programme and explore what benefits it may have for families who visit. We are particularly interested in any benefits that the programme has for children's development, in particular children with disabilities, and neurodivergent children.
Who will be participants?
For this part of the research project, the participants are the public frequenting the club
What will you have to do?
If you would like to be involved you do not have to do anything but frequent the club or approach reserchers to share your experience.
Potential benefits
Very little is known about the potential benefits of community initiatives like this. Any evidence of benefits could help grow the project, or develop other similar ones, so more families could benefit.
Right to withdraw
It is entirely up to you whether you wish to participate in this research project. You are free to withdraw from the research project at any time and without giving a reason.

Confidentiality
Participation in this project will remain confidential.

This research project has been approved by the Human Research Ethics Committee at the University of Waikato as HREC (Health2024#12). Any questions or concerns about the ethical conduct of this research may be sent to the Secretary of the Committee, email humanethics@waikato.ac.nz, postal address, Human Research Ethics Committee, University of Waikato, Te Whare Wananga o Waikato, Private Bag 3105, Hamilton 3240.

Appendix J- Group 3 Information sheet

Participant Information Sheet Group 3

Dr Angelika Anderson School of Psychology The University of Waikato Phone: 07 838 4466 ext 9209 Email: angelika@waikato.ac.nz	Tamara Geary Email: tg90@students.waikato.ac.nz Jacob Gedye Email: jg311@students.waikato.ac.nz

Project title: Preliminary evaluation of a model train community initiative

Dear members of the Greater Waikato Railway Modellers (GWRM)
We are doing a research project investigating the impact of the model railway programme. We (Jacob Gedye; Tamara Geary) are two master's students at the University of Waikato, supervised by Dr Angelika Anderson. This research will be used to write our masters' theses. Please read this information sheet so that you can decide whether you would like to participate.

What is this research about?
We were invited by Paul Murphy to conduct this research project. Our aim is to describe the model railway programme and explore what benefits it may have for families who visit. We are particularly interested in any benefits that the programme has for children's development, in particular children with disabilities, and neurodivergent children.
Who will be participants?
For this part of the research project, the participants are members of the GWRM who are present at the Sunday sessions of the model train programme.
What will you have to do?
We would like to invite you to participate in a focus group, consisting of you and other members of the GWRM. We are interested to hear your experiences with, and views about the programme: what you like about it, what you have noticed about the way families interact with the trains, and in particular how children interact with the trains and other people in the room. Focus groups will be held in a room provided at the Leamington Domain, Cambridge at a time convenient to you, and without Paul Murphy being present. These focus groups will be audio recorded. During the focus groups, the researchers will ask questions to stimulate discussion. They may also ask follow-up questions related to talking points during the session. You do not have to respond to any questions if you do not want to. We expect that the focus groups will take 1 – 1 ½ hours.

Paul Murphy will not have access to any recordings or transcripts. He will only have access to a summary report of the focus groups.

Potential benefits

Very little is known about the potential benefits of community initiatives like this. Any evidence of benefits could help grow the project, or develop other similar ones, so more families could benefit.

Right to withdraw

It is entirely up to you whether you wish to participate in this research project. You are free to withdraw from the research project at any time and without giving a reason. It may be difficult to withdraw your data / voice from any recordings, but we can remove your statements from any transcript if you wish. You will have the opportunity to review the transcript before we begin the analysis. You will need to respond with any comments or alterations to the transcript, or request to withdraw from the study, within 2 weeks of receiving the transcript. If you have any further questions, you are free to contact any one of the researchers at any time.

Confidentiality

Participation in this project will remain confidential. Though the researchers will likely know your name, pseudonyms will be used on any documents or reports.

This research project has been approved by the Human Research Ethics Committee at the University of Waikato as HREC (Health2024#12). Any questions or concerns about the ethical conduct of this research may be sent to the Secretary of the Committee, email humanethics@waikato.ac.nz, postal address, Human Research Ethics Committee, University of Waikato, Te Whare Wananga o Waikato, Private Bag 3105, Hamilton 3240.

Appendix K- Group 3 Consent form

Ψ **School of Psychology**

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

A completed copy of this form should be retained by both the student and the participant.

Behavioural psychology masters: Impact model trains have on people

Please complete the following checklist. Tick (✓) the appropriate box for each point.	**YES**	**NO**
1. I have read the Information Sheet (or it has been read to me) and I understand it.		
2. I am willing to give consent to participate in this research		
3. I have been given sufficient time to consider whether or not to participate.		
4. I am satisfied with the answers I have been given regarding the research and I have a copy of the information sheet and this consent form.		
5. I understand that being part of the research is voluntary (my choice) and that I may withdraw consent at any time without penalty.		
6. I understand that I have the right to decline consent to participate in the research.		
7. I know who to contact if I have any questions about the research in general.		
8. I understand that the students will need to audio-record interviews.		
9. I give consent for the students to audio record some of their work with me in it. This audio will be anonymous and kept in a secure place.		
10. I consent to researchers observing me interacting with the model trains.		
11. I understand that Paul has been the person that recruited the researchers to conduct this focus group		
12. I understand that the information I provide could be used in future academic publications.		
13. I wish to receive a copy of the findings.		

I agree to participate in the research for the masters thesis, and I understand that I may withdraw my consent at any time. If I have any concerns about this project, I may contact Angelika Anderson (angelika.anderson@waikato.ac.nz) to discuss further.

Signature: Date:

Appendix L- Group 2 Consent Form

Ψ School of Psychology

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

GROUP 2 CONSENT FORM

A completed copy of this form should be retained by both the student and the guardian of the participant.

Behavioural psychology masters: Impact model trains have on people

Please complete the following checklist. Tick (✓) the appropriate box for each point.	**YES**	**NO**
1. I have read the Information Sheet (or it has been read to me) and I understand it.		
2. I am willing to give consent for _____ (child's name) to participate in this research.		
3. I have been given sufficient time to consider whether or not to allow _____ (child's name) to participate.		
4. I am satisfied with the answers I have been given regarding the research and I have a copy of the information sheet and this consent form.		
5. I understand that being part of the research is voluntary (my choice) and that I may withdraw consent at any time without penalty.		
6. I understand that I have the right to decline consent for _____ (child's name) to participate in the research.		
7. I know who to contact if I have any questions about the research in general.		
8. I consent to researchers observing me and my child interacting with the model trains.		
9. I understand that the information I provide could be used in future academic publications.		
10. I wish to receive a copy of the findings.		

I agree for _____ (child's name) to participate in the research for the masters thesis, and I understand that I may withdraw my consent at any time. If I have any concerns about this project, I may contact Angelika Anderson (angelika.anderson@waikato.ac.nz) to discuss further.
Guardians name (Please print):

Signature: Date: