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Kyleigh Marie Kai-Li Melville

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"Talk to me about the LEGO!" A qualitative exploration of autistic students' experiences with LEGO-Based Therapy

Kyleigh Marie Kai-Li Melville

University of Edinburgh

ABSTRACT

LEGO-Based Therapy (LBT) is a play-based social skills intervention which is being employed widely in schools across the UK to support autistic students' social and emotional wellbeing. However, the existing literature lacks insight into how the children themselves experience and benefit from this intervention. Furthermore, there is a need for research that engages with under-represented autistic individuals (e.g., those with accompanying cognitive, behavioural and language difficulties). The following study explored autistic students' experiences with LBT and aimed to answer whether and how this intervention supports their social and emotional wellbeing in school. The experiences of 14 autistic students with accompanying cognitive, behavioural or language needs (N_{female} = 2, M_{age} = 10.14 , $N_{Caucasian}$ = 5) from an independent special school in London were captured using video-recorded semi-structured interviews. Multimodal qualitative analysis yielded three key themes*: i. Students have positive experiences with LEGO, ii. Majority of students have positive experiences with LBT, and, iii. LBT helps the majority of students and they have suggestions on how it can be better adapted to support them.* These findings and the methodology are discussed and emphasise that in order to better represent the entire spectrum of needs in the autistic community in school-based research, future research can use mixed-method approaches which promote positive rapport so neurodivergent children and young people feel empowered to share their experiences through a medium which supports their needs.

KEYWORDS

Autism, Lego-Based Therapy, qualitative methods, special education, wellbeing

Introduction

Autism is a neurodevelopmental condition primarily characterised by language profiles, social communication and motor behaviours that differ to those of neurotypical individuals (Frith, 2008). Autistic children have been reported to have a greater difficulty in intuitively understanding conventional social norms and rules compared to their non-autistic peers (Travis et al. 2001) and forming intimate peer social relationships (Varley et al., 2019). Research has additionally reported a significant number of autistic children experience social barriers, such as isolation and peer rejection (Ochs et al., 2001; Humphrey & Lewis, 2008; Kasari et al., 2011). A proposed reason is the observed differences in how autistic children engage socially, specifically, in how they play.

Play is a pleasurable, voluntary and intrinsically motivating behaviour (Wolfberg, 1999), which as a vehicle for exploratory learning, can promote positive educational and developmental outcomes (Kossyvaki & Papoudi, 2016). Rubin (2012) proposes play contributes to children's cognitive and social development; cognitively, the manipulation and organisation of objects to represent people, places and things in the imaginary world of play helps children to develop an understanding of real-world problem solving. From the social perspective, playing with objects and ideas independently and with others facilitates the exploration and expression of emotional states. Subsequently, there has been a recent conceptual shift towards "play-

CONTACT Kyleigh Marie Kai-Li Melville, k.m.k.melville@sms.ed.ac.uk

based learning" approaches, acknowledging the combined benefits of play and traditional teaching (Skene et al., 2022). Several studies have yielded positive links between guided play and socioemotional outcomes such as prosocial skills, vocabulary development and production of spatial language (Copplan et al., 2010; Han et al., 2010; Ferrara et al., 2011).

Developmental and skill-based comparisons have suggested neurodivergent and neurotypical children exhibit different play characteristics to one another such as response to cues, emotional regulation in play environments, and attentional focus (Lester & Russell, 2008). Autistic play has been widely described as stereotyped and repetitive and autistic children have been further described to have greater difficulty in engaging in interactive pretend play (LeGoff et al., 2012; Kossyvaki & Papoudi, 2016). Autistic children are observed to engage in longer and more frequent periods of solitary play and to push others away from their play objects (Kasari & Chang, 2014). Autistic individuals can focus on and engage in activities they are highly motivated by, at the expense of losing awareness of information relevant to other activities (Murray et al., 2005). Autistic biographies and memoirs have highlighted play can involve deep focus on sensory objects and activities such as looking at and engaging with parts of nature (sticks, gravel, sand), and following patterns in light and drawings (Willans, 2020). It is important to note that autistic play experiences are frequently interpreted through a developmental-stage lens, which implies a trajectory of expected progress; however, this is problematic as it does not take into account how playfulness can simply be a different way of expressing emotional, physical and psychological behaviours towards objects and others (Willans, 2020). However, due to these differences in engaging in play, autistic children have been observed to be at greater risk of social rejection compared to their non-autistic peers (Humphrey & Symes, 2011).

Play's crucial role in the development of social and communication skills, along with its inherent sense of 'fun' as a mode of learning, has inspired the development of interventions that empower autistic children to build upon and strengthen their existing social skills (Gibson et al., 2021). A play-based social skill intervention being used more widely in schools is LEGO-Based Therapy (LBT) (LeGoff, 2004). LeGoff (2004) found that LEGO bricks are well-suited for a variety of intervention strategies, and observed children's inherent interest in playing with them strengthened willingness to engage in therapeutic activities whilst also engaging both therapist and peers to collaborate on joint tasks. Contemporary research has found that physical manipulative play, such as with LEGO bricks, gives children opportunities to simultaneously develop language and socioemotional skills, and further foster creativity and imagination (Honey et al., 2007; Byrne & Ramchandani, 2022). Through the medium of structured play, LBT aims to facilitate crucial social skills such as turn-taking, active listening, problem-solving and teamwork (Lindsay et al., 2017). Children are assigned to one of three roles: parts supplier, builder or engineer. The parts supplier is responsible for finding the bricks for the project. The builder is responsible for putting the bricks together. The engineer is responsible for giving instructions to the parts supplier and builder on which pieces to find and how to put them together. Each role requires engagement in verbal and nonverbal communication, collaboration and joint attention to tasks and engages the childrens' movement/coordination, ii) self-regulation and active listening to instructions, and, iii) social interaction/peer communication skills (Owens et al., 2008; LeGoff et al., 2014). LBT further aims to strengthen motivation for social interaction and social-efficacy by facilitating positive group interaction (LeGoff et al., 2012).

A recent systematic review of LBT literature found that the intervention can empower participants to practise social skills alongside positive impacts on participants' rigidity, verbal communication and family relationships (Narzisi et al., 2021). LBT is a flexible intervention which can be employed in a variety of settings (e.g., home, clinics, schools) and further provides the possibility to adopt different methodologies. However, several limitations across the existing literature included low overall quality of studies, extreme variability across clinical and socio-demographic characteristics and small sample sizes. Despite these limitations, LBT is widely employed in mainstream, independent and special schools across the UK (Varley et al., 2019). LBT has been mainly prescribed to autistic students but is steadily being employed to wider groups of students who would benefit from school-based opportunities to develop social communication skills, such as students with social emotional mental health (SEMH) needs (Boyne, 2014). Subsequently,

school-based research has sought to gather insight into how school-based interventions can be adapted to improve students' educational and wellbeing outcomes (Drewes & Schaefer, 2010). Evans and Bond (2021) examined how LBT is employed in two mainstream schools in England and found that LBT is perceived by staff and parents to be beneficial to their students and that the intervention can be adapted successfully when facilitated by a trained member of staff. Barr et al. (2022) employed qualitative interviews and questionnaires with facilitators and carers of autistic children and found that overall acceptability was high for both groups due to observed improvements in students' communication and social skills. Barriers to delivering LBT included lack of resources and conflicting staff schedules, however the facilitators reported that these barriers did not outweigh the benefits. However, in both studies, adaptations to the intervention were not proposed by the students themselves therefore, it has been suggested that students should be given the opportunity to participate in forming decisions surrounding this intervention.

Rationale and Research Aims

Although the number of qualitative studies in autism research is steadily on the rise, the majority of existing literature has focused on quantitative investigations of the autistic experience viewed through the lens of the deficit model of disability (Happé & Frith, 2020). This model defines a 'deficit' as the absence or lack of some feature, trait, or capacity that an individual ought to have in order to be characterised as 'typically developing' (Dinishak, 2016). This model is problematic because it highlights the absence of certain processes or capacities, without considering alternative explanations or embracing the strengths of individuals who diverge from what society labels as 'normal' (Bagatell, 2010; Waltz, 2020). Contemporary research emphasises instead to conceptualise autism through the social model of disability, where it is not the individuals themselves who are lacking, but their surrounding environments and wider society which are failing to accommodate and support them (Woods, 2017). The social model of disability further encourages researchers to explore holistically; as autism is a variable and multifaceted condition, where individuals can possess additional cognitive, behavioural and language needs, it is unreasonable to posit a singular understanding (Anastasiou & Kauffman, 2013). This study therefore sought to contribute to the growing body of qualitative autism research and embrace a nuanced, holistic approach to exploring and deepening our understanding of autism.

Additionally, the majority of participants recruited for autism research are individuals without accompanying cognitive, behavioural or language difficulties (Frith, 2008; Tager-Flusberg & Kasari, 2013). Therefore, the existing research on autism, and how autistic individuals feel they benefit from LBT, does not portray an understanding reflective of the wider autism spectrum. This study therefore sought to provide a possible approach on how to engage, empower and accommodate under-represented autistic students (i.e., students with accompanying cognitive, behavioural and language needs).

Furthermore, there is little insight into specifically how or why LBT supports autistic students. Although there is growing evidence of LBT's success in schools, there is a lack of pupil voice on how this intervention does or does not support their social and emotional wellbeing in these settings. Children have the right to express their opinions on decisions that impact them (Lansdown, 2011) therefore, there is a need for research to proactively engage with autistic students and listen to how they feel about the interventions that are prescribed to them in school. Enabling students to share their experiences is very beneficial to provide insight into the validity of interventions and factors that contribute to social and emotional wellbeing which have yet to be considered (O'Farrelly et al., 2020). Furthermore, supporting and inviting students to inform decisions about their own wellbeing can lead to further self-development opportunities (Pavlopoulou et al., 2022). The following study therefore aimed to explore autistic students' experiences with LBT and how this intervention does, or does not, support their social and emotional wellbeing in school by answering the following questions:

1. What experiences do autistic students have with LBT?

2. Do autistic students find taking part in LBT useful in school?
3. Do autistic students want changes in how LBT is employed in their school?

Method

Design

This study employed a cross-sectional design, using semi-structured interviews recorded on camera. This method is widely employed in school-based research and captures both verbal and nonverbal behaviours (Wilson, 2017) and enables the collection of rich, unique experiences (Magnusson & Marecek, 2015), providing a humanistic perspective on complex phenomena (Howitt & Cramer, 2017). The use of semi-structured interviews in particular enables in-depth exploration of participants' responses and allows researchers to validate the participants' unique meanings and experiences (Barriball & While, 1994).

Ethical considerations

This study adhered to all ethical considerations as outlined in the BPS's Code of Ethics and Conduct (2018), and BERA Guidelines (2018). As autistic children are a particularly vulnerable population, every effort was made to safeguard their wellbeing during the recruitment and participation process. Prior authorisation from the study school and informed consent was collected from the participants' carers.

Participants

Participants were recruited using opportunistic sampling from an independent special school in London, where the researcher worked as a Special Education Needs (SEN) educator. The following sampling criteria aimed to mitigate sampling limitations.

Inclusion criteria

A student was included if: i) they currently attended the study school, ii) LBT was part of their school timetable, iii) they had a sufficient understanding of English to give informed assent and / or consent, iv) they had a clinical diagnosis of autism from a qualified assessing clinician or team (e.g., the National Health Service), and, v) they had the ability to follow and understand simple verbal and / or visual prompts and instructions.

Exclusion criteria

A student was excluded from participating if: i) they had a physical or cognitive impairment which prevented them from participating in the interview and a chosen free play activity, ii) they did not a possess a sufficient understanding of English to give informed assent and / or consent, and, iii) they did not have the ability to follow and understand simple verbal and / or visual prompts and instructions.

Sample characteristics

The sample consisted of fourteen participants from various cultural and ethnic backgrounds aged 6-14 years old (N_{Male}=12 , M_{age}= 10.14, SD_{age}=2.24) . All participants had a diagnosed behavioural, cognitive or language need in addition to their autism diagnosis; two participants had ADHD, four participants had a speech/language disorder, four participants had oppositional defiant disorder (ODD), one participant had an eating disorder, one participant had an anxiety disorder and four participants had social-emotional mental health (SEMH) needs.

Measures

A five-question interview schedule with an accompanying Picture Exchange Communication System (PECs) was piloted with two eligible participants (see table 1). Wording of the questions was simplified to accommodate the variety of levels of understanding amongst the participants. The number of questions was

also kept to a minimum to accommodate the participants' marked short attention spans and concentration difficulties. After conducting the Pilot Session, several changes were made to the interview schedule (see table 2). Participants expressed that they wanted questions to be more direct and that the term "LEGO club" be used, as this is the term the speech and language therapist uses with them. Participants further expressed that the PECS confused and distracted them (these students do not use PECS to communicate) and suggested that the researcher keep them to the side during the interview and only bring them out for specific students who use them.

Table 1
Pilot interview schedule

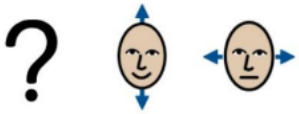
Question	PECS
1. Do you like playing with LEGO?	
2. Why do you / do you not like playing with LEGO?	
3. How does playing with LEGO make you feel?	
4. How do you play with LEGO in LBT?	
5. Does playing with LEGO in LBT help?	

Table 2
Modified interview schedule

Question
1. Do you like LEGO?
2. Why do you like / not like LEGO?
3. Do you like LEGO club?
4. Why do you like / not like LEGO club?
5. Does LEGO club help you in school?
6. How does LEGO club help / not help you in school?
Additional questions (when participants indicated interest in answering more)
7. Do you want more LEGO club?
8. How can LEGO club be better?

Procedure

Ten interview sessions took place from February to April 2022, specific times and dates for each session were agreed upon with the participants and their class teachers. Participants' background information (i.e., age, ethnicity, gender) was made to generate ID codes to maintain confidentiality and anonymity. Prior to starting the recording, participants were asked for their verbal consent on being filmed. One participant requested to have their interview recorded with audio only. Interviews were video recorded using a DSLR camera mounted on a tripod set up in front of a table holding a box of LEGO or the participants' chosen free play activity. Participants were introduced to the semi-structured interview and given a set of verbal instructions (PECS of the instructions were on the table to the side in case). Interviews ranged in duration from three to thirteen minutes and the format (i.e., individual, pair or group) was decided upon by the participants themselves in terms of what would make them feel most comfortable. The following table illustrates the configuration in which each participant was interviewed and their chosen free play activity (see table 3).

Table 3
Interview configuration by participant

Question	Interview Configuration	Chosen Activity
P1	Individual	LEGO bricks
P2	Individual	LEGO bricks
P3	Individual	Didn't want to play with anything
P4	Individual at the beginning, joined group later	Kicking a soft football (individual), LEGO bricks (group)
P5	Group	LEGO bricks
P6	Group	LEGO bricks
P7	Group	LEGO bricks
P8	Group	LEGO bricks
P9	Group	LEGO bricks
P10	Pair	Paper and pencil
P11	Pair	Paper and pencil
P12	Pair	LEGO bricks
P13	Pair	LEGO bricks
P14	Individual	LEGO bricks

After completion of the interview, participants were debriefed and thanked for their time. *Community Involvement Statement:* Two primary autistic students aided in the creation of the interview schedule materials by participating in a Pilot session.

Data Analysis

Thematic analysis

As the study was exploratory in nature, an inductive approach was used to analyse the qualitative data, enabling the creation of new knowledge in an emerging and under-researched area (Willig, 2013). Multimodal analysis was employed to analyse the interview footage. Braun and Clarke's (2006) six-phase thematic analysis framework was used to analyse the transcripts:

1. Familiarisation of the data was completed via reading and re-reading of transcripts
2. An initial code set was generated according to interesting features in the data
3. Themes were discovered

4. Themes were reviewed to ensure they related to the initial code set
5. Themes were defined and named
6. Findings were related back to existing literature

26 codes emerged from the transcripts and were grouped into three key themes: i. Experiences with LEGO, ii. Experiences with LEGO club, and, iii. LBT helps and students have suggested changes. In addition, two sub themes were identified: i. Engagement with the camera, and, ii. Participants as researchers. Eight participants expressed that they wanted to have more LBT sessions per week, two participants expressed they wanted to have less LBT and two participants expressed they wanted to do alternative interventions to LBT. (See Appendix 1 for a table outlining the codes that fell into each theme, and the prevalence of each code across the transcripts and qualitative examples of each code).

Video analysis

As all the participants had an accompanying cognitive, behavioural, or language needs, Norris's (2004) video analysis framework was used to analyse participants' nonverbal behaviours, specifically proximity, interactions with LEGO and the use of gestures. These behaviours were chosen as:

1. Changes in the participants' proximity and interactions with the LEGO box could be a nonverbal sign of strength of engagement with the interview or topic under discussion
2. Participants' use of gestures could elaborate upon or emphasise specific points in their verbal responses

Interview footage was watched several times to transcribe verbal content and to familiarise with the participants' nonverbal behaviours. From the recordings, 136 screenshots were taken, generating seven codes. The frequency of each behaviour are recorded in the table below (see table 4):

Table 4
Frequency of nonverbal behaviours

Code	Behaviour	Frequency
B1	Looks into the LEGO bucket	7
B2	Moves closer to the LEGO bucket	20
B3	Reaches into the LEGO bucket	53
B4	Moves closer to the camera	15
B5	Shows LEGO build to peer(s)	5
B6	Shows LEGO build to researcher	4
B7	Collaborative building	2

The figures below are captured examples of each coded nonverbal behaviour. Opaque circles were used to preserve participant anonymity. Green circles were used to identify moments where the participants' displayed their LEGO builds to their peers or the researcher (Figure 6). Green arrows were used to indicate when participants' moved closer to the camera or the researcher (Figure 4).

If they chose to play with LEGO, the majority of participants chose to build their own LEGO models during their interview. The most prevalent nonverbal behaviour was to reach into the LEGO bucket (Figure 3). In the group interview, participants who moved the bucket closer to themselves (Figure 2) tended to move the bucket back into the centre of the table so others could reach and look for pieces (Figure 1). Several participants raised their completed models above their heads so they could show their peers (Figure 5), the camera or the researcher. Collaborative building mainly took place between the minimally verbal participants

(Figure 7) and the researcher (Figure 8).

Figure 1. *B1: Looks into the LEGO bucket*

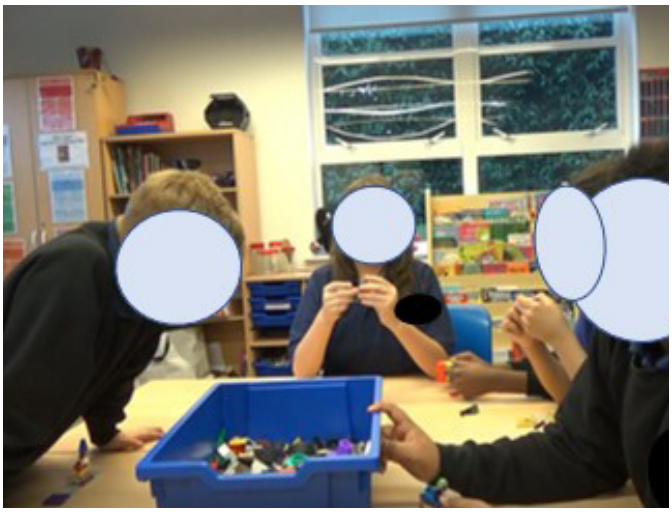


Figure 2. *B2: Moves closer to the LEGO bucket*

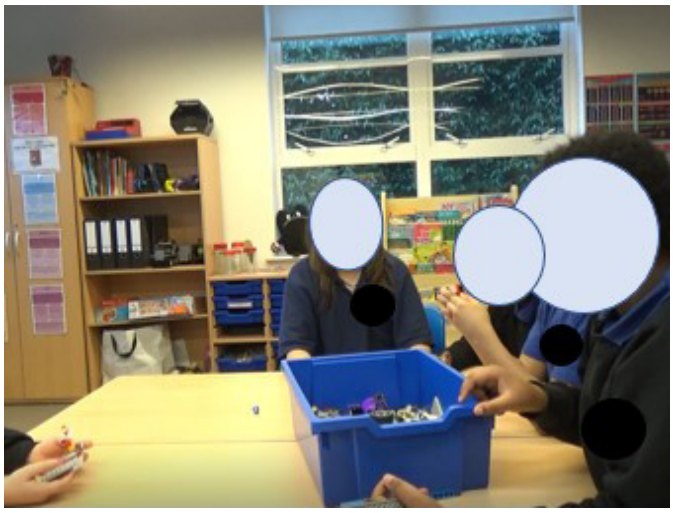


Figure 3. *B3: Reaches into the LEGO bucket*

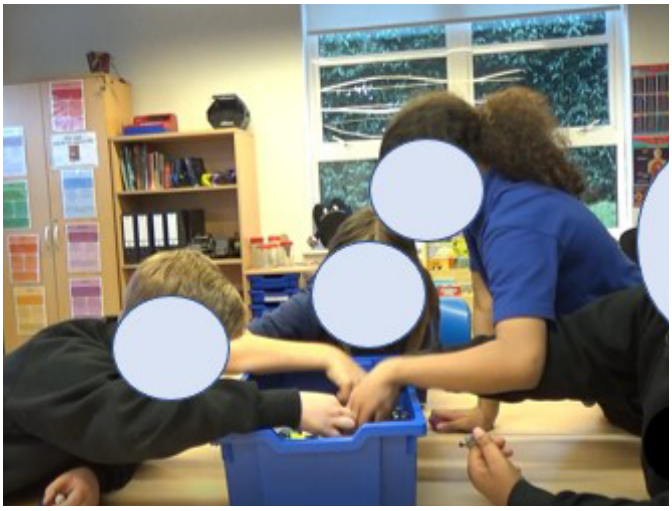


Figure 4. *B4: Moves closer to the camera*

Figure 5. *B5: Shows LEGO build to peer(s)*

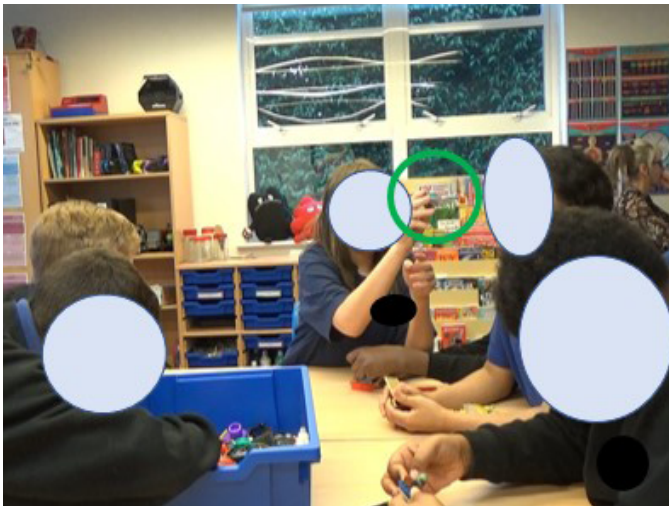


Figure 6. *B6: Shows LEGO build to researcher*

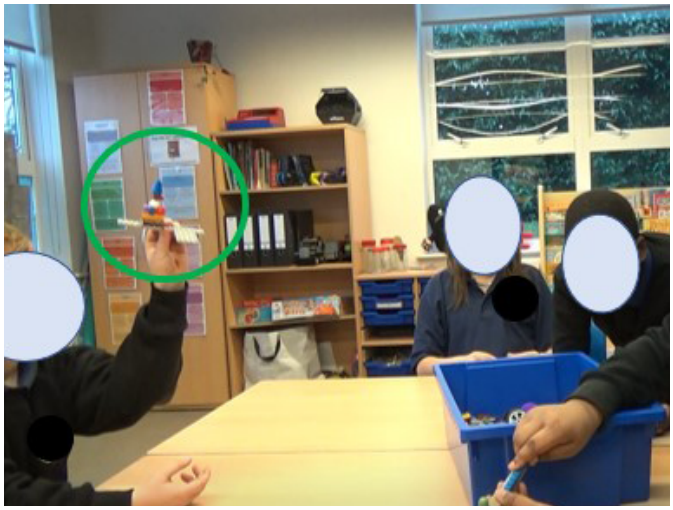


Figure 7. *B7: Collaborative building (peers)*

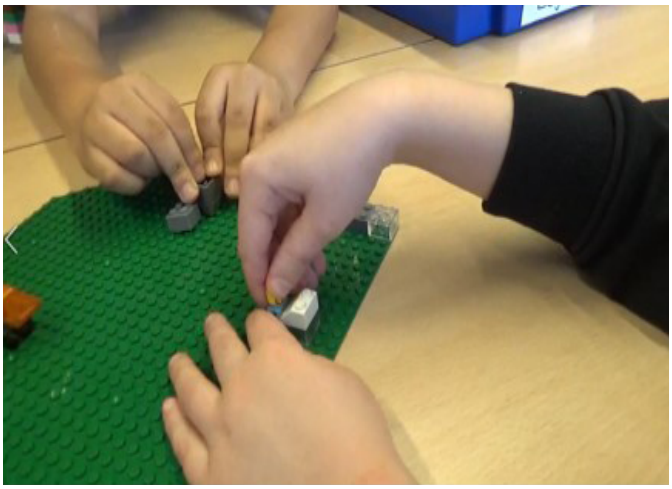
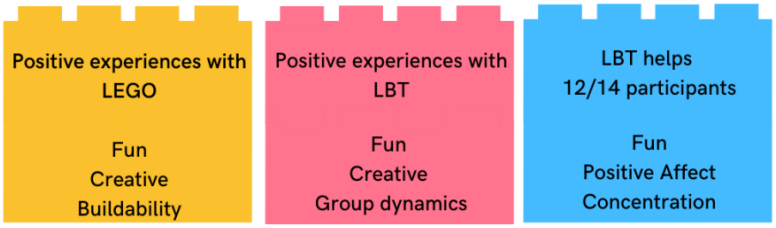


Figure 8. *B7: Collaborative building (researcher)*

Results

Overall, there was a strong engagement across all interviews irrespective of the interview configuration. Figure 9 summarises the key themes that emerged from the analysis; language was taken directly or synthesised from that of the participants.

Figure 9
Key themes



"It takes you to another universe": Positive experiences with LEGO

All participants expressed they liked LEGO because it is "fun" and "you can build whatever you want" highlighting that LEGO is an ideal medium through which to conduct play-based learning as there is no barrier or limit to what you can build. Some participants identified specific pieces and models that make them happy (e.g., "red and purple flower", "horses and stables", "USC Star Destroyer"), indicating that LEGO is a medium that brings positive affect and encourages the formation and expression of their preferences. In the group and pair interviews, participants agreed with one another that LEGO bricks themselves are pleasing "because it's very fiddly", suggesting playing with LEGO bricks satisfies their sensory feedback needs.

Notably, one of the participants with a speech and language disorder described their building process to the researcher during their interview: "Yes, look! Yeah, I really, I can make a dog and then I'm building a house and then this, add the classes, some here" [goes to retrieve a piece from the LEGO tray]. "Add the church, and this here are watching the computer [clicks a LEGO man in front of a small piece], and this" [removes a piece from another one of his build's and attaches it to his main build, this piece has another LEGO man on it], "Hello! I'm a robot!" [pretends the arriving LEGO man greets the LEGO man at the computer]. This interaction highlights how through the medium of play with the LEGO, the student used language functionally and was motivated to describe their building process to another. This interaction further

demonstrated the participant's strong motivation to conduct pretend play sequences with the LEGO figures, posing a challenge to deficit-model research which suggests pretend play is too challenging for autistic children to initiate.

"I like being the Builder!": Experiences with LBT

Most participants expressed they liked LBT because "it's fun", "creative", "entertaining" and "we get to build [spaceships] and stuff", indicating their positive emotions towards playing with LEGO has transferred to engaging in the intervention itself. LBT encourages them "to make a group effort", "to follow instructions" and they like that they "get to switch roles", suggesting that they enjoy the group dynamics LBT promotes. A couple of participants emphasised they have favourite roles, "the Engineer" and "the Builder", indicating they are aware that LBT requires them to take on roles they may not prefer but are willing to take on as necessary to the completion of the group's goal (i.e. complete the LEGO build).

Contrastingly, one participant explained being the Builder "gives them a certain control over [their] compatriots" and they "like having control over things and making everything go smoothly", suggesting that the switching of roles can be a source of discomfort for them as they don't always have full control of the LEGO-building process in the group. Some participants expressed they don't like LBT sometimes because "it can take forever and I just don't like it", which suggests that LBT may not always be enjoyable for students who have shorter attention or focus spans. Notably, one participant described LBT group dynamics as "anarchy" and that "it usually takes ten minutes to build something smaller than your hand", indicating a dislike for the LBT rule of needing to conduct several communication exchanges with the group members in order to complete the LEGO build.

"It makes me feel a lot happier": How LBT helps and suggested changes

Most participants expressed that LBT helps them in school because it makes them "feel a lot happier" and that "when you're having a bad day or like you're very frustrated, it cheers you up", highlighting how the combined positive effect of playing with LEGO and shared enjoyment of working together to build a specific LEGO build with peers can promote positive social and emotional wellbeing. A participant further expressed that LBT can also "take your mind off what happened", suggesting LBT can aid in emotional regulation and soothing feelings of discomfort from interactions that took place before the LBT session takes place. Several participants said "it's hard to explain" how LBT helps them, but when asked directly how LBT makes them feel, they responded "it makes me feel calm and relaxed."

A couple participants mentioned LBT "helps me concentrate in class", supporting the posit that LBT's activation of verbal and nonverbal communication and attention processes can support learning. In contrast, two participants expressed that LBT doesn't help them in school. When asked by the researcher to elaborate, one participant said:

> there are better clubs that could do the same job as LEGO club and better because a club, at least in my opinion, brings more out and I think there's much better ways to do that and more by doing different clubs.

Currently in the study school, each class has one 45-minute LBT session per week. The majority of participants wanted to have LBT more than once a week, with preferences ranging from "five times a week", to "ten times more", to "two million" times more. These explicit expressions of wanting to take part in more sessions demonstrates how the students clearly found utility and benefit from the intervention in school. Contrastingly, one participant said "once a week is enough" and one participant said they don't want more LBT sessions "because it drives you insane". When asked what changes would make LBT more useful for them, they replied "get only single students who do their own thing, that would be a lot better for me." This particular response suggests LBT being an intervention that takes place with a group of students may not be as motivating to take part in for students who have a stronger and more rigid motivation to play on their own.

Alternatively, one participant gave a detailed description of how they would alter the design of LBT, with the understanding that LBT "is supposed to make me more social":

> ... maybe have it so, that you could have at least five roles for the amount of people. So there would be an Engineer, Builder, uh… Collector, and then Manager, who manages everyone and then maybe like … ooo that would be fun, maybe like a Destructor or a Demoman, which works against the party to destroy the building... Or maybe you can have two groups working against each other to build the thing the fastest.

This example of incorporating a competitive aspect and additional roles highlights the importance of listening to the students' suggestions, as the changes to the intervention can increase motivation for taking part, particularly for students who may possess a stronger need for control or dislike of taking part in group interventions.

Two sub themes arose from the analysis, the first one being the participants' strong interest and engagement in the camera. Although the camera sometimes distracted the participants' focus on the interview itself, their desire to engage with the camera contributed to an overall display of strong motivation to share their experiences. Several participants asked if they could record themselves, their peers or the researcher after completing their interview, resulting in a couple of short videos being filmed by the participants. Allowing the participants to make short films about their LEGO builds after the interview proved to be a powerful, tangible incentive for participants who were at first a little reluctant to engage.

Secondly, several participants wanted to interview the researcher about LEGO after completing their interviews, "Wait Miss, I'm going to ask you these questions", "Miss, can I make a video about you?" I want to have a turn.". Participants were curious if the researcher would say "the same things" about LEGO and expressed joy when the researcher agreed about LEGO being a fun, creative toy and repeated the interview transcript to the researcher. This interaction can be suggested to be an example of imitation or role play in which the participants were able to gain insight to what it is like being on the other side of a researcher-participant dynamic.

In the group interview, several participants assisted the researcher in collecting experiences from one of their peers, 'P5', who had a Year 1 level understanding of English but was fluent in Spanish. Although P5 did not elaborate when using PECS, he responded more enthusiastically when one of his classmates translated and repeated questions twice for him in Spanish and English or when his peers played with LEGO alongside him. The group interview in particular was very insightful as the participants took strong initiative to communicate with one another, show their LEGO builds to one another, and support one another's answers to the researchers' questions on how they feel about LBT, strongly suggesting that the intervention's goal of encouraging social communication and group-based interactions was being achieved with these students.

Strengths, Limitations and Future Avenues

Evaluation of Findings - Key Themes

All participants expressed LEGO is a fun and creative toy, the main appeal being they could build anything they wanted. These experiences support LeGoff (2004) who found that LEGO bricks appear to be a particularly effective medium of play for working with autistic children. This positive disposition towards LEGO itself subsequently informed twelve out of fourteen participants' positive experiences with LBT. The intervention was described as fun, creative and a positive opportunity to engage in different social roles using structured LEGO play. Most of the participants expressed LBT supports their social and emotional wellbeing in school. The key benefit was that LBT is a fun activity that helps students feel better and improves their concentration in class post-intervention. The majority of participants expressed that they wanted more LBT sessions per week; this is very encouraging as previous systematic reviews of play-based interventions in

schools found implementation daily or twice a week for a minimum of six weeks can significantly strengthen students' social and emotional wellbeing (Kent et al., 2020). Across all themes, the element of fun was a key motivator for participants playing with LEGO and engaging in LBT. The benefits of play for autistic children are well documented (Mastrangelo, 2009), and the degree to which the students found LBT fun could stem from finding certain play activities more enjoyable than other sensory-activating activities, as suggested by the concept of monotropism in autism (Murray et al., 2005). Future LBT research can more deeply explore the specific motivations of autistic students for engaging in LBT and how the intervention's fun nature supports students' social and emotional wellbeing. Measures that address areas such as motivation and fun in play can provide further insight into the children's potential and assist in shifting the focus of the intervention from filling a deficit, to instead building upon pre-existing strengths (O'Farrelly et al., 2020).

Contrastingly, two out of the fourteen participants expressed they did not enjoy taking part in LBT and that the intervention doesn't help them in school. The participants explained the main reasons were the need for control, dissatisfaction with their peers, and the length of time it takes to complete sessions. Although both participants enjoyed playing with LEGO itself, their enjoyment did not transfer over to their recorded experiences of LBT. One participant introduced the idea of competition being incorporated into LBT in terms of who can build the model the fastest. They further suggested the creation of two more roles and playing games as alternatives to LBT, such as chess and Monopoly. These alternatives would give students choice in how many people to interact with (i.e., chess is played between two, Monopoly requires at least four people). The number of players required to play a game could indicate students' level of comfort in engaging with others, where some would rather play one-to-one and others with a larger group. In contrast, one participant would rather build LEGO models in isolation with no peer interaction. This particular response is significant as it raises the question of how useful LBT might be for students who are so adamant on playing alone and who possess, perhaps unfounded, negative views of their peers.

Evaluation of Findings - Sub themes

The camera proved to be a powerful tool to engage participants who were feeling shy or reluctant to engage in the interview. The use of cameras and recording technology is widely employed in research with children, as it gives a multimodal portrayal of how children engage with the world and more freedom in how they can express themselves (Cook & Hess, 2007; Luttrell, 2010). However, there are several confounding variables that come with video recording (Sparrman, 2005), the most pertinent being whether the participants over or under-performed for the researcher or each other. For example, the participants could have felt self-conscious about being recorded and compensated by being overly enthusiastic or closed off. Although, this limitation was mitigated by the researcher's existing professional relationship and experiences on how to encourage communication and soothe overstimulation. However, it was not possible to control participants' motivation for completing the interview to record with the camera, which resulted in a couple shorter interviews (average length of 3 minutes). Although this may have resulted in an incomplete account of some participants' experiences, their evident excitement and joy of being involved in the research process was very meaningful to them and their carers. Video recording and technology is increasingly being employed to teach social skills to autistic students (Parsons, 2006; Alzyoudi et al., 2015; Halle et al., 2016). With this in mind, future research could explore, as LBT gains more attention and utility in schools, how technology could enhance or support autistic students' experiences with LBT, particularly those with additional accessibility needs.

Furthermore, it was significant witnessing the participants sharing control and, in some instances, taking control of the interview. Although significant effort was made to enable coherent communication with participants with comorbid speech and language disorders using PECS and simple verbal instructions, it was not possible to completely overcome the communication barrier. This may have contributed to these particular participants being more withdrawn or shy in their interviews. However, this gave the opportunity for the participants, particularly in the group interview to support one another in communicating their experiences. Research has emphasised the importance of empowering autistic communities and validating the experiences

they choose to share with the research community (Crompton & Fletcher-Watson, 2020a, 2020b). Ideally, this positive experience in engaging with research can empower and encourage the participants and their families to engage with and contribute to future research.

Evaluation of Methodology

It is important to consider the impact of the researcher's pre-established professional relationship with the participants. At the time of data collection, the researcher had been working in the study school as a SEN Teaching Assistant for six months. By that time, strong positive rapport had been established with all the students that chose to participate. Therefore, it was not possible to completely mitigate expectancy bias as the participants were aware of the existing relationship between themselves and the researcher. There is a possibility that what the participants' chose to express in their interviews may have been influenced by what they believed the researcher 'expected' of them to say, thus raising the question of findings' validity. However, this pre-existing relationship enabled the collection of rich, unique experiences from a subpopulation of the autism community on an intervention that has only been qualitatively explored from the perspectives of facilitators and carers. Should this study be replicated in a setting where the researcher(s) do not have a pre-existing relationship, great care and consideration must be taken to assure the participants are in a safe space where they can feel empowered to express themselves freely. This can be achieved via the employment of a participatory action research approach (i.e., PAR; Reason, 1998; Ditrano & Silverstein, 2006) where the participants and researchers explore in collaboration and produce knowledge and action directly useful to the participants.

A notable strength was the flexibility in how the participants could express themselves (e.g., verbally, in writing, visually), providing a medium through which all participants could each share their unique 'voice'. The interviews were conducted in a configuration decided upon by the participants and at a time that minimised the impact on the participants' regular school timetable, as significant changes in routine and unfamiliar situations can be a significant source of distress for autistic individuals (Happé & Frith, 2020). Several measures were incorporated to ensure all participants understood the aims of the study and could choose how they wished to engage in the research process (e.g., PECS, simple instructions, choice of a free play activity, how the interview is recorded). These measures were incorporated with the specific aim of enabling participants to take control of how they participate in a way that meets their specific needs. In addition, the employment of multimodal data collection enabled the analysis of verbal and nonverbal behaviours. The sample comprised participants with varying abilities in their language production and understanding therefore, this method catered to students on the spectrum who may not have otherwise been able to participate. The nonverbal behaviours give another perspective through which to gain insight into the participants' feelings towards LBT. For example, reaching into the LEGO bucket was the most frequent behaviour (53 times) whereas collaborative building occurred the least (2 times), suggesting that although there was consensus that LEGO is fun to play with and LBT is engaging, perhaps the participants are less motivated or inclined to build together. Despite this, several participants showed their LEGO models to their peer(s) (5 times) and to the researcher (4 times), suggesting they take pride in their creations and want them to be seen. The challenge of short interview transcripts was overcome by synthesising the verbal and nonverbal data into a more comprehensive understanding of the participants' experiences. An advantage of multimodal analysis is that the researcher can choose which specific target behaviours to code and analyse, enabling focus on specific phenomena in greater detail (Norris, 2004). Therefore, replications of this study could explore additional behaviours and contribute to a deeper understanding of autistic students' experiences with LBT.

A significant limitation was the lack of a follow-up on participants' experiences due to uncontrollable factors (i.e., school, staff and class timetables). This left the researcher to infer the complete meanings of the participants' experiences based on their professional relationship with the students. Follow-up sessions would have been helpful to further explore participants who had negative experiences with LBT and who did not feel the intervention supported them in school. In addition, potential avenues for how to adapt the

intervention to better suit their needs could have been identified and elaborated upon. Follow-up sessions could have further yielded concrete examples of what other kinds of play-based activities participants would have liked to engage in instead to strengthen their social skills. Significant differences in frequency of nonverbal behaviours could have also been further explored. This limitation could be conclusively addressed in a replication of the study, where one or multiple follow-up sessions are concretely incorporated and agreed upon by all stakeholders.

Lastly, it is worth noting the degree to which these findings are representative of the wider autistic population. In this case, 82% of the students in the study school identified as male, as is the case for most of the existing literature on autism and LBT. Due to this gender imbalance, gender differences in experiences with LBT could not be determined in this study. Gender differences in social communication have been widely documented in autism, where autistic girls and women have been reported to possess stronger social attention, linguistic abilities, motivation for friendship and a stronger tendency to socially camouflage (Lai & Szatmari, 2020). It is therefore worth exploring whether female autistic students experience LBT differently to their male peers. Although, this study's sample included a mixed ethnic composition and age range, enabling the collection of experiences with LBT from a group of students from diverse backgrounds. To the researcher's knowledge, this is the first study to not only explore and collect first-person experiences of LBT from autistic students, but also the first study to explore these experiences in autistic students with accompanying behavioural, language and cognitive needs. Such additional needs can affect how autistic children learn, process and understand verbal and nonverbal social cues (Melville, 2021), which could potentially account for the similarity and differences between the participants' experiences with LBT. Future replications of this study and other mixed-methods research can explore this hypothesis in more depth.

Conclusion

LBT is being employed more and more in schools across the UK to support social skill learning in autistic students. This study has shown a possible avenue on how to include autistic students with accompanying cognitive, behavioural and language needs in qualitative research to develop a more holistic understanding of how and why LBT does or does not support autistic students in school. To better represent the entire spectrum of needs in the autistic community, future research must recognise and embrace the importance of establishing strong, positive rapport with the community. As researchers and practitioners, we have a duty to engage and empower all students on the spectrum so that we can better understand how school-based interventions can be adapted to better support all autistic students in a school environment.

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References

Alzyoudi, M., Sartawi, A., & Almuhiri, O. (2015). The impact of video modelling on improving social skills in children with autism. *British Journal of Special Education, 42*(1), 53-68. https://doi.org/10.1111/1467-8578.12057

Anastasiou, D., & Kauffman, J. M. (2013). The social model of disability: Dichotomy between impairment and disability. Journal

of Medicine and Philosophy: A forum for bioethics and philosophy of medicine, 38(4), 441-459. https://doi.org/10.1093/jmp/jht026

Bagatell, N. (2010). From cure to community: Transforming notions of autism. Ethos, 38(1), 33-55. https://doi.org/10.1111/j.1548-1352.2009.01080.x

Barr, A., Coates, E., Kingsley, E., de la Cuesta, G. G., Biggs, K., Le Couteur, A., & Wright, B. (2022). A mixed methods evaluation of the acceptability of therapy using LEGO® bricks (LEGO® based therapy) in mainstream primary and secondary education. Autism Research. https://doi.org./10.1002/aur.2725

Barriball, K. L., While, A. (1994). Collecting data using a semi-structured interview: A discussion paper. Journal of Advanced Nursing, 19(2), 328–335.

Boyne, S. E. J. (2014) An evaluation of the 'Lego" Therapy' intervention used to support children with social communication difficulties in their mainstream classroom. DAppEdPsy thesis, University of Nottingham. http://eprints.nottingham.ac.uk/id/eprint/14603

Braun, V., Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101.

British Educational Research Association [BERA]. (2018). Ethical Guidelines for Educational Research, 4th edition. London. Available from https://www.bera.ac.uk/researchersresources/publications/ethicalguidelines-for-educational-research-2018

Byrne, E. M., & Ramchandani, P. G. (2022). Educational interventions involving physical manipulatives for improving children's learning and development: a scoping review. 10.31234/osf.io/ztsyh

Chamberlain, B., Kasari, C., & Rotheram-Fuller, E. (2007). Involvement or isolation? The social networks of children with autism in regular classrooms. Journal of autism and developmental disorders, 37(2), 230-242. https://doi.org.10.1007/s10803-006-0164-4

Cook, T., & Hess, E. (2007). What the camera sees and from whose perspective: Fun methodologies for engaging children in enlightening adults. Childhood, 14(1), 29-45. https://doi.org/10.1177/0907568207068562

Crompton, C. J., Hallett, S., Ropar, D., Flynn, E., & Fletcher-Watson, S. (2020a). 'I never realised everybody felt as happy as I do when I am around autistic people': A thematic analysis of autistic adults' relationships with autistic and neurotypical friends and family. Autism, 24(6), 1438-1448. https://doi.org.10.1177/1362361320908976

Crompton, C. J., Ropar, D., Evans-Williams, C. V., Flynn, E. G., & Fletcher-Watson, S. (2020b). Autistic peer-to-peer information transfer is highly effective. Autism, 24(7), 1704-1712. https://doi.org.10.1177/1362361320919286

Dinishak, J. (2016). The deficit view and its critics. Disability Studies Quarterly, 36(4). https://escholarship.org/content/qt9rf3r38t/qt9rf3r38t.pdf

Ditrano, C.J. and Silverstein, L.B. (2006) 'Listening to parents' voices: Participatory action research in the schools.,' Professional Psychology: Research and Practice, 37(4), pp. 359–366. https://doi.org/10.1037/0735-7028.37.4.359.

Drewes, A. A., & Schaefer, C. E. (Eds.). (2010). School-based play therapy. Hoboken, NJ: John Wiley & Sons.

Ethics Committee of the British Psychological Society. (2018). Code of Ethics and Conduct. Leicester ; The British Psychological Society.

Evans, V., & Bond, C. (2021). The implementation of Lego®-Based Therapy in two English mainstream primary schools. Journal of Research in Special Educational Needs, 21(2), 111-119. https://doi.org.10.1111/1471-3802.12504

Ferrara, K., Hirsh-Pasek, K., Newcombe, N., Golinkoff, R., & Shallcross Lam, W. (2011). Block talk: Spatial language during block play. Mind, Brain, and Education, 5, 143–151. https://doi.org/10.1111/J.1751-228X.2011.01122.X

Frith, U. (2008). Autism: A very short introduction (Vol. 195). Oxford University Press.

Gibson, J. L., Pritchard, E. J., & de Lemos, C. (2021). Play-based interventions to support social and communication development in autistic children aged 2-8 years: A scoping review. https://doi.org/10.31234/osf.io/mp2xc

Halle, S., Ninness, C., Ninness, S. K., & Lawson, D. (2016). Teaching social skills to students with autism: A video modeling social stories approach. Behavior and Social Issues, 25(1), 42-54. https://doi.org./10.5210/bsi.v.25i0.6186

Han, M., Moore, N., Vukelich, C., & Buell, M. (2010). Does play make a difference? Effects of play intervention on at-risk preschoolers' vocabulary learning. American Journal of Play, 3, 82–105. https://d1wqtxts1xzle7.cloudfront.net

Happé, F. G., & Frith, U. (2020). Annual Research Review: Looking back to look forward–changes in the concept of autism and implications for future research. Journal of Child Psychology and Psychiatry, 61(3), 218-232. https://doi.org/10.1111/jcpp.13176

Honey, E., Leekam, S., Turner, M., & McConachie, H. (2007). Repetitive behavior and play in typically developing children and children with autism spectrum disorder. Journal of Autism and Developmental Disorders, 37, 1107–1115. https://doi.org.10.1007/s10803-006-0253-4

Howitt, D., & Cramer, D. (2017). Research Methods in Psychology. Pearson.

Humphrey, N., & Lewis, S. (2008). Make me normal' The views and experiences of pupils on the autistic spectrum in mainstream

secondary schools. Autism, 12(1), 23-46. https://doi.org.10.1177/1362361307085267

Humphrey, N., & Symes, W. (2011). Peer interaction patterns among adolescents with autistic spectrum disorders (ASDs) in mainstream school settings. Autism, 15, 397–419. https://doi:10.1177/1362361310387804

Kasari, C., & Chang, Y. C. (2014). Play development in children with autism spectrum disorders: Skills, object play, and interventions. In Handbook of Autism and Pervasive Developmental Disorders, Fourth Edition. (pp.263-277). John Wiley & Sons.

Kasari, C., Locke, J., Gulsrud, A., & Rotheram-Fuller, E. (2011). Social networks and friendships at school: Comparing children with and without ASD. Journal of autism and developmental disorders, 41(5), 533-544. https://doi.org.10.1007/s10803-010-1076-x

Kent, C., Cordier, R., Joosten, A., Wilkes-Gillan, S., Bundy, A., & Speyer, R. (2020). A Systematic Review and Meta-analysis of Interventions to Improve Play Skills in Children with Autism Spectrum Disorder. Review Journal of Autism and Developmental Disorders, 7(1), 91–118. https://doi.org/10.1007/s40489-019-00181-y

Kossyvaki, L., & Papoudi, D. (2016). A review of play interventions for children with autism at school. International Journal of Disability, Development and Education, 63(1), 45-63. https://doi.org.10.1080/1034912X.2015.1111303

Lai, M. C., & Szatmari, P. (2020). Sex and gender impacts on the behavioural presentation and recognition of autism. Current opinion in psychiatry, 33(2), 117-123. https://doi.org/10.1097/YCO.0000000000000575

Lansdown, G. (2011) Every Child's Right to be Heard: A Resource Guide on the UN Committee on the Rights of the Child General Comment, No. 12. London: Save the Children.

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

LeGoff, D. B., Krauss, G. W., & Allen, S. L. (2012). LEGO-Based Play Therapy for Improving Social Competence in Children and Adolescents With Autism Spectrum Disorders. In Play-based interventions for children and adolescents with autism spectrum disorders (pp. 143-164). Routledge.

LeGoff, D. B., De La Cuesta, G. G., Krauss, G. W., & Baron-Cohen, S. (2014). LEGO®-Based Therapy: How to build social competence through LEGO®-Based Clubs for children with autism and related conditions. Jessica Kingsley Publishers.

Lester, S., & Russell, W. (2008). Play for a change: Play, policy and practice: A review of contemporary perspectives. London: National Children's Bureau.

Lindsay, S., Hounsell, K. G., & Cassiani, C. (2017). A scoping review of the role of LEGO® therapy for improving inclusion and social skills among children and youth with autism. Disability and health journal, 10(2), 173-182. https://doi.org/10.1016/j.dhjo.2016.10.010

Luttrell, W. (2010). "A camera is a big responsibility": A lens for analysing children's visual voices. Visual studies, 25(3), 224-237. https://doi.org/10.1080/1472586X.2010.523274

Magnusson, E., & Marecek, J. (2015). Doing interview-based qualitative research: A learner's guide. Cambridge University Press.

Mastrangelo, S. (2009). Harnessing the power of play: Opportunities for children with autism spectrum disorders. Teaching Exceptional Children, 42(1), 34-44. https://doi.org/10.1177/004005990904200104

Melville, K. M. K.-L. (2021). The importance of verbal language in the development of social understanding in autistic children. Cambridge Educational Research e-Journal, 8, 80-93. https://doi.org/10.17863/CAM.76203

Murray, D., Lesser, M., & Lawson, W. (2005). Attention, monotropism and the diagnostic criteria for autism. Autism, 9(2), 139-156. https://doi.org/10.1177/1362361305051398

Narzisi, A., Sesso, G., Berloffa, S., Fantozzi, P., Muccio, R., Valente, E., ... & 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

Norris, S. (2004). Analyzing multimodal interaction : A methodological framework. Taylor & Francis Group.

O'Farrelly, C., Booth, A., Tatlow-Golden, M., & Barker, B. (2020). Reconstructing readiness: Young children's priorities for their early school adjustment. Early Childhood Research Quarterly, 50, 3-16. https://doi.org/10.1016/j.ecresq.2018.12.001

Owens, G., Granader, Y., Humphrey, A., & Baron-Cohen, S. (2008). LEGO® therapy and the social use of language programme: An evaluation of two social skills interventions for children with high functioning autism and Asperger syndrome. Journal of autism and developmental disorders, 38(10), 1944-1957. https://doi.org.10.1007/s10803-008-0590-6

Parsons, L. D. (2006). Using video to teach social skills to secondary students with autism. Teaching Exceptional Children, 39(2), 32-39. https://doi/pdf/10.1177/004005990603900206

Pavlopoulou, G., Usher, C., & Pearson, A. (2022). 'I can actually do it without any help or someone watching over me all the time and giving me constant instruction': Autistic adolescent boys' perspectives on engagement in online video gaming. British Journal of Developmental Psychology. https://doi.org.10.1111/bjdp.12424

Reason, P. (1998) 'Political, epistemological, ecological and spiritual dimensions of participation,' Studies in Cultures, Organizations and Societies, 4(2), pp. 147–167. https://doi.org/10.1080/10245289808523509.

Rubin, L. C. (2012). Playing on the Autism Spectrum. In Gallo-Lopez, L., & Rubin, L. C. (Eds.) Play-based interventions for children and adolescents with autism spectrum disorders. Routledge.

Skene, K., O'Farrelly, C. M., Byrne, E. M., Kirby, N., Stevens, E. C., & Ramchandani, P. G. (2022). Can guidance during play enhance children's learning and development in educational contexts? A systematic review and meta-analysis. Child Development, 00, 1–19. https://doi.org/10.1111/cdev.13730

Sparrman, A. (2005). Video recording as interaction: Participant observation of children's everyday life. Qualitative Research in Psychology, 2(3), 241-255. https://doi.org/10.1191/1478088705qp041oa

Tager-Flusberg, H., & Kasari, C. (2013). Minimally verbal school-aged children with autism spectrum disorder: The neglected end of the spectrum. Autism research, 6(6), 468- 478. https://doi.org/10.1002/aur.1329

Travis, L., Sigman, M., & Ruskin, E. (2001). Links between social understanding and social behavior in verbally able children with autism. Journal of autism and developmental disorders, 31(2), 119-130. https://doi.org/10.1023/a:1010705912731

Varley, D., Wright, B., Cooper, C., Marshall, D., Biggs, K., Ali, S., ... & Teare, D. (2019). Investigating Social Competence and Isolation in children with Autism taking part in LEGO-based therapy clubs In School Environments (I-SOCIALISE): study protocol. BMJ open, 9(5), e030471. https://doi.org/10.1136/bmjopen-2019-030471

Waltz, M. (2020). The production of the 'normal' child: Neurodiversity and the commodification of parenting. In Neurodiversity Studies (pp. 15-26). Routledge.

Willans, B. (2020). Using playwork perspectives and ethnographic research to move towards an understanding of autistic play culture. In Further Perspectives on Researching Play from a Playwork Perspective (pp. 20-36). Routledge.

Willig, C. (2013). Introducing qualitative research in psychology. McGraw-Hill Education.

Wilson, E. (Ed.). (2017). School-based research: A guide for education students. London: SAGE.

World Health Organization. (1993). The ICD-10 classification of mental and behavioural disorders: Diagnostic criteria for research. Geneva: World Health Organization.

Wolfberg, P. (1999). Play and imagination in children with autism. New York, NY: Teachers College Press.

Woods, R. (2017). Exploring how the social model of disability can be re-invigorated for autism: in response to Jonathan Levitt. Disability & society, 32(7), 1090-1095. https://doi.org.10.1080/09687599.2017.1328157

Appendices

Appendix 1

Coded Exerts (Thematic Analysis)

Theme	Code	Frequency	Examples
Positive experiences with LEGO	1A: Likes LEGO	14	[When asked if they like LEGO, they responded with "Yes", "Yeah" or nodding their head] LEGO bricks
	2A: Fun	6	"It's fun to play with."
	3A: Creative	3	"It's creative." / "use your imagination and create builds far beyond your world and everything."
	4A: Buildability	8	"...takes you to another universe, where you can build whatever you want."
	5A: Specific colours/pieces	3	"Uh the flowers and the red, and the red, and purple and red ones." / "I rebuilt the USC Star Destroyer."
	6A: Particular connection	1	"LEGO comes from Denmark and my Dad's Danish."
	1A-: Does not like LEGO	1	"I like LEGO but I don't at the same time."
	2A-: Mess	1	"... sometimes it gets messy and then you feel like never cleaning up and then you have to clean it up."
	3A-: Time	1	"... eventually you start building it and then you forget about building it."
Positive experiences with LBT	1B: Like LEGO club	12	[When asked if they like LEGO club, they responded with "Yes", "Yeah" or nodding their head]
	2B: Fun	4	"Yeah, because it's fun." / "It's very entertaining."
	3B: Creative	2	"It's creative."
	4B: Building	4	"Yeah, because we get to build spaceships and stuff."
	5B: Group dynamic	3	"Um that we made a group effort." / "Because we have to follow the instructions, we can't just build a random what we want, we have to follow the instructions."
	6B: Specific roles	3	"I like being the Builder!"

Appendix 1 (Cont.)

	7B: Control	1	"... I have a certain control over my compatriots which um help me, not not really help me … it's kind of hard to explain. But I like having control over things and making everything go smoothly."
	1B-: Does not like LEGO club	2	[When asked if they like LEGO club, they responded with "No" or shook their head]
	2B-: Time	2	"Because sometimes it takes forever and I just don't like it." / "Whenever we use her method of trying to build stuff, it would usually take a few - ten minutes to build something smaller than your hand. However, one time when she wasn't here and we just did it ourselves, uh guess what, we did it in not ten minutes, ten seconds."
	3B-: Group dynamic	1	"And basically it will mostly, most of the time you're screaming at the, the guy who's giving the instructions is screaming 'I need you to get the red square brick' and then the other guy is shouting 'Which red square brick is it?' and then the other person who's putting it together is saying 'Can I get the brick yet?' so it's just anarchy.'
LBT helps students in school	1C: LEGO club helps	12	[When asked if LEGO club helps them, they responded with "Yes", "Yeah" or nodding their head]
	2C: Positive affect	5	"... it makes me feel a lot happier." / "Because when you're having a bad day or like you're very frustrated, it like cheers you up."
	3C: Fun	3	"Mhm, it's just something fun to do." / "...because you get to do fun things."
	4C: Concentration	2	"It helps me concentrate in class."
	5C: Building	1	"Just learning how to build stuff."
	1C-: LEGO club doesn't help	2	[When asked if LEGO club helps them in school, they responded with "No" or shaking their head.]
	2C-: Doesn't do what it's designed to do	2	"Because I think there is better clubs that could um that does the same job as LEGO club and better because I like, a club, at least in my opinion, I think it um brings more out and I think there's much better ways to do that and more by doing different clubs."