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ORIGINAL ARTICLE

# How does a 'Jewellery Club' adaptation of the Lego Therapy intervention impact on social anxiety and interactions between girls aged 7 with social communication interaction difficulties?

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## Abstract

This study investigated the impact of a 'Jewellery Club' on girls with social, communication and interaction difficulties. The project focussed on three girls aged seven who participated in an intervention using similar principles to the 'Lego Therapy' intervention. An action research approach was followed, where two phases of the intervention were undertaken with participants engaging with a weekly 20 min session for 3 weeks per phase. The impact of the intervention was assessed through the use of a social difficulties log, field notes and unstructured interviews with parents. Findings identified an overall reduction in social difficulties and social anxiety related to school as well as improved play experiences for the participants during unstructured school times and highlighted the importance of the intervention being aligned with the interests of the participants. The findings suggest that reflection on the gendered nature of interventions may be useful when considering how research might be implemented in practice.

**KEYWORDS**

autism, early intervention, girls with autism, social anxiety, social communication and interaction difficulties

## Key Points

- This study offers deep insights into work which has taken place to support primary-aged girls who have been identified with social, communication and interaction difficulties.
- Much literature related to the social difficulties experienced by autistic individuals is approached from a neurotypical standpoint. The voice and experiences of autistic individuals need to be central in both research and the design of interventions.
- The body of literature concerned with supporting autistic learners is broadly focussed on boys. This study offers a perspective on how existing, evidence-based interventions may need to be adapted to better meet the needs of autistic girls.
- Within the context of the underdiagnosis of autistic females, this study evidences that an adapted intervention, co-designed with the learners, can support girls with social, communication and interaction difficulties to impact positively on social anxiety and peer interactions.

# INTRODUCTION

Studies have suggested that autistic girls often go undiagnosed (Dworzynski et al., 2012, p. 793; Petrou et al., 2018, p. 32). This can lead to missed opportunities for early intervention and support regarding social communication and interaction difficulties (Lupindo et al., 2022); a common area of need for autistic individuals (Knott et al., 2006, p. 609). This in turn increases the risk of mental health problems, such as anxiety (Bargiela et al., 2016; Rae & Hershey, 2019, p. 113). Furthermore, existing social communication interventions are often based on male-biased samples (Legoff & Sherman, 2006), which could influence their efficacy when used to support girls with social communication difficulties such as autism.

This research focussed on three girls aged seven, attending a mainstream UK primary school. The girls have been identified as having Social, Communication and Interaction Difficulties (SCIDs). The SCIDs between the three girls have resulted in them experiencing anxiety and self-esteem issues, impacting their ability to learn (Rae & Hershey, 2019, p. 113). To date, the support and interventions offered have done little to improve the experiences of these children, perhaps as these interventions did not align with their interests (Leadbitter et al., 2021, p. 4), and so the aim of this research was to investigate whether an intervention aligned with the learners' interests could improve outcomes for learners with SCIDs, reducing social anxiety and improving well-being.

The basic principles of the 'Lego Club' therapy intervention (Legoff & Sherman, 2006) were adapted, in order to align with the interests of the participants (Leadbitter et al., 2021, p. 4); in this instance the participants chose bracelet making, forming a 'Jewellery Club'.

## Review of literature

Missed diagnosis (Dworzynski et al., 2012, p. 793; Petrou et al., 2018, p. 32) and misdiagnosis of autistic females (Young et al., 2018, p. 402) could be partly due to current diagnostic criteria and screening methods being largely based upon studies involving autistic boys (Carpenter et al., 2019, p. 3; Young et al., 2018, p. 401). In addition, masking (Grant, 2019, p. 32), parental expectations of different genders and the understanding of professionals of female autistic traits can influence rates of diagnosis (Young et al., 2018, p. 400). Mis-diagnosis and delay in diagnosis significantly impact opportunities for early intervention, which has been shown to be an important success factor (Fuller & Kaiser, 2020).

For autistic individuals, SCIDs can create significant disadvantages (Knott et al., 2006, p. 609). These difficulties can be a barrier to academic success (Welsh et al., 2001, cited in Ostmeyer & Scarpa, 2012, p. 932) and can impact negatively on emotional well-being (Dubin, 2009, pp. 86–87; White & Roberson-Nay, 2009), leading to meltdowns (Wild, 2019, p. 74) and withdrawal from social situations (Sedgewick & Pellicano, 2019, p. 129). In emerging adults, low self-esteem can lead to jealousy and friendship difficulties (Farooq et al., 2020).

The negative impact on mental health cause by SCIDs is particularly true for late-diagnosed autistic individuals (Lupindo et al., 2022). However, much of this research relies on small sample sizes with a bias towards autistic males; in White and Roberson-Nay's (2009) sample, 18 of the 20 participants were male. Nevertheless, in my professional experience, autistic children and indeed autistic girls can struggle academically and emotionally if their needs are not met (Bargiela et al., 2016), which may further impact on their ability to make friends (White & Roberson-Nay, 2009, pp. 1006–1007).

Difficulties surrounding friendships can be a particular problem for autistic children (Cook et al., 2017, p. 303). This can be due to difficulties with initiating conversation, turn taking and non-verbal skills (Knott et al., 2006, p. 614). As a result of this, autistic children are more likely to be bullied (Forrest et al., 2020) and may have fewer friends than their neurotypical counterparts (Bauminger & Kasari, 2000, cited in Cook et al., 2017, p. 303). Autistic children may find it challenging to recognise the emotions of others (Tutt, 2019, p. 63). Furthermore, friendships of autistic children are often seen to be of 'poorer quality' than that of their neurotypical peers (Calder et al., 2013, p. 296), although it is worth noting that the authors fail to discuss whether their methods of assessment are reliant upon neurotypical experiences of what constitutes a good friendship. Indeed, despite being of 'poorer quality', autistic children are often satisfied with their friendships (Petrina et al., 2017), perhaps due to autistic individuals having a different perception of friendship to neurotypicals (Calder et al., 2013, p. 298). This highlights why it is important for the needs and wishes of autistic children to be central to any social communication intervention (Leadbitter et al., 2021, p. 4).

It is important to note that much of the current research into social difficulties of autistic individuals seems to be approached from a neurotypical standpoint. Indeed, Cook et al. (2017) claim at the beginning of their abstract that 'little is known about the experiences of girls with autism', when it can be argued that autistic girls know much about their own experiences and instead there has been a lack of published research into the experiences of girls with autism

(Cook et al., 2017, p. 302; Sohn, 2019). This highlights the importance of including the voice of autistic individuals, specifically autistic females, in future research.

### Interventions

Social communication interventions work best if aligned with the interests of autistic individuals (Legoff et al., 2014, p. 12) and follow a consistent structure (Lawson, 2019, p. 184). Carpenter, Happé and Egerton (2019, p. 4) suggest that special interests tend to be gender influenced. Much of the existing researching into autism relies on male samples (Young et al., 2018, p. 400) and Wolstencroft et al. (2021, p. 1062) claim most social communication interventions were designed for autistic males. Indeed, Hull et al. (2018, cited in Wolstencroft et al., 2021, p. 1062) assert that social skills interventions need to be adapted to meet the needs of autistic girls.

Legoff and Sherman (2006, p. 319) claim that their 'Lego Club' social communication intervention takes advantage of the gratifying feeling experienced by many autistic children when building with Lego. Legoff and Sherman's (Legoff & Sherman, 2006) research into the long-term outcomes of the Lego Therapy intervention found that children who participated in Lego Therapy showed statistically significant improvements in a broad range of social skills, above those experienced by children who received a comparable intervention (Legoff & Sherman, 2006, p. 326). It is important to note that only 11 out of the 60 participants were female and that if a different gender balance were included in the study results may have been different. Given the importance of the gratifying feeling achieved by Lego Therapy (Legoff & Sherman, 2006), when planning social communication interventions, they should be aligned with the particular interests of the participants (Leadbitter et al., 2021, p. 4), who may, for example, not have an interest in Lego.

Whilst the need to align interventions with the interests of the participants is important (Leadbitter et al., 2021, p. 4), perhaps most importantly, there is a need to consider the purpose of the intervention. It is worth noting that Legoff and Sherman (2006, p. 326) assert that a 'reduction in autistic-type social behaviours' was observed in children who participated in their Lego Club. This implies the intervention has been viewed through the lens of the medical model (Gillespie-Sells & Campbell, 1991, cited in Burke, 2008, p. 13), with the aim of 'rectifying' autistic behaviours. The recent neurodiversity movement has called into question the ethics underpinning interventions that seek to make individuals 'less' autistic and instead emphasises the importance of the wishes of autistic individuals (Leadbitter et al., 2021, p. 1). The aim of this research is to be child-led in supporting children who wish to socialise with their peers but have difficulties in doing so, with the hope of positively impacting on their emotional well-being.

## RESEARCH DESIGN

### Paradigm, approach and methodological framework

The research approach is predicated on the ontology that the world is made up of ascertainable facts, aligning with a positivist paradigm (Thomas, 2017, pp. 108–109). However, the nature of this research required not only quantitative but also qualitative methods that align with an interpretivist paradigm (Cohen et al., 2018, p. 6). There is a false dichotomy between quantitative and qualitative methods (Pring, 2015, p. 45), and as such, a pragmatic paradigm stance was adopted (Biesta & Burbules, 2003, p. 90).

Action research allows for professionals to solve problems and improve practice (Koshy, 2010, cited in Forster & Eperjesi, 2021, p. 2). This methodology was adopted to address an existing problem; improving anxiety and interactions between specific girls with social communication difficulties and inform interventions for children with similar needs going forwards. Action research is a circular process of action and reflection (Thomas, 2017, p. 154) and two cycles were undertaken (Figure 1) comprising of data gathering, a 'Jewellery Club' jewellery making intervention (Appendix 1) and critical reflection.

The structure of the 'Jewellery Club' intervention was based on the key principles of Lego Therapy (Legoff & Sherman, 2006); that a group of children work collaboratively in clearly defined roles in order to create something highly motivating. In this case, copies of bracelets or necklaces were created during the intervention. The roles mimicked those in Lego Therapy; a 'designer', the only participant who could see the bracelet to be recreated; a 'parts-selector', the participant with the beads; and a 'jewellery-maker', who threaded the beads. As with Lego Therapy, there was a focus on 'verbal and non-verbal communication, joint attention and task focus, collaborative problem-solving, sharing and turn-taking' (Legoff & Sherman, 2006, p. 318).

The intervention was undertaken on a weekly basis for 20 min sessions that took place over 6 weeks, with a constant familiar adult leading each session. The three roles were shared out between the participants and the 'designer' was given a bracelet or necklace with a random pattern of beads, hidden from the view of the other participants. The

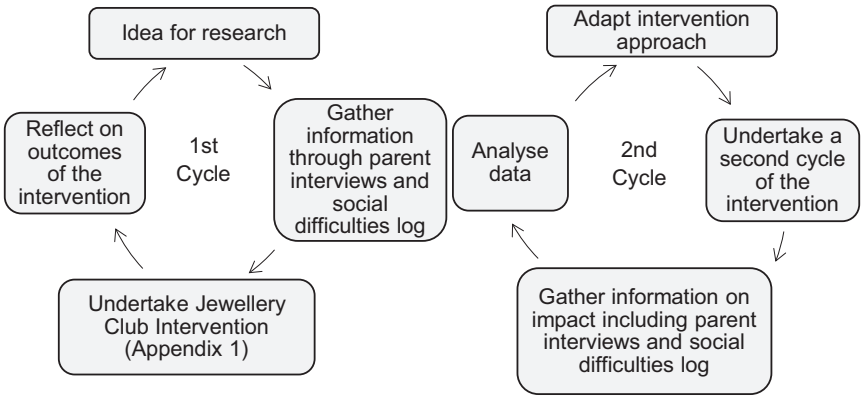


**FIGURE 1** Action research cycles undertaken, adapted from Thomas (2017, p. 155).

'designer' then verbally described each bead to the 'parts-selector', visually and verbally checking and clarifying to ensure the correct bead had been chosen. The 'parts-selector' then selected the correct bead, asking for clarification if they were unsure, and passed this to the 'jewellery maker', who threaded the bead onto the elastic. The 'designer' used visual and verbal checking-in to ensure the 'jewellery maker' was ready before they gave the next instruction to the 'parts-selector'. Once the piece of jewellery was finished, it was tied off by either the 'jewellery maker' or the assisting adult. The children then swapped roles and repeated the exercise. This happened once more until all of the participants had completed each of the roles.

## Sampling

A non-probability, purposive sampling approach (Cohen et al., 2018, p. 214) was adopted, selecting participants from within the lead researcher's class cohort. The participants were three 7-year-old girls with SCIDs.

## Data gathering

Due to the nature of the participants' SCIDs, interviews, surveys and questionnaires were not appropriate tools to capture the voice of the participants. A Mosaic approach (Clark & Moss, 2017, pp. 33–34) was taken, triangulating the views of children, parents and practitioners through social difficulties logs, informal interviews and field notes (Figure 2).

A social difficulties log was adapted from an antecedent, behaviour, consequence (ABC) log (Smith, 2020, p. 95). Staff addressed SCIDs as without changing their practice and recorded instances on the log. This was undertaken for a week before and a week after the intervention. In order to limit the Hawthorne effect (Thomas, 2017, p. 148), participants were not aware of this log. The initial research design included a log between the two intervention cycles but due to participant and staff absence this did not occur. In addition, informal observations of the three participants from the lead researcher's perspective as the class teacher were also recorded both on the social difficulties log and through unstructured notes.

The views of the parents were elicited through unstructured interviews (Thomas, 2017, p. 205) during pre-existing Early Help review meetings, which allowed parents to share their views in a familiar environment and aimed to minimise parent anxiety. Due to the greater need for interpretation in unstructured interviews (Thomas, 2017, p. 206), the parents' views were verified by summarising what they said verbally and recording this in the meeting notes, which were shared with parents, providing them with an opportunity to correct any misconceptions.

During the intervention itself, qualitative data about the social difficulties of each child was gathered through unstructured observations taken by the lead researcher as an active member (Palaiologou et al., 2016, p. 146). Field notes (Forster & Eperjesi, 2021, pp. 74–76) were taken on a laptop (Appendix 2); whilst supervising the intervention and supporting the participants, with recordings taken of any noteworthy comments and difficulties, strengths or improvements in interaction behaviours (Knott et al., 2006, p. 614). Relying on a single observer who was also an active participant may have impacted on the trustworthiness of this method of data gathering as not all comments or behaviours were recorded. However, audio or video recordings of the sessions were not viewed to be appropriate

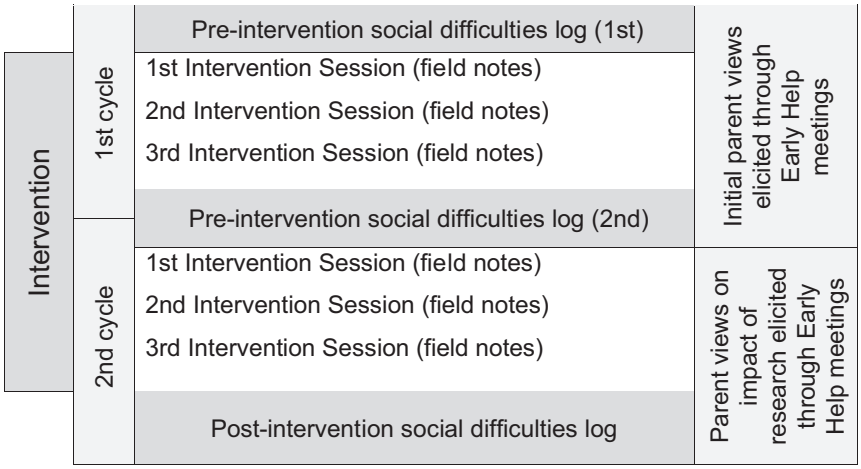


**FIGURE 2** Overview of data collection strategy structure.

methods for documenting the sessions due to the speech and language difficulties of two of the participants and having a second adult as an observer would not have been practical in a school setting.

## Ethical considerations

Throughout this research, BERA (2018) guidelines were followed. Informed consent was obtained from the headteacher, parents and staff both verbally and via consent forms which outlined the right to withdraw, the data gathered and how this would be used.

Due to the nature of action research and that the researcher was also the teacher (Cohen et al., 2018, p. 125), care was taken to ensure children gave verbal assent before the intervention and, due to their level of development, the right to withdraw was informed by their willingness to participate (BERA, 2018, p. 15). The intervention was undertaken in a familiar and comfortable setting (BERA, 2018, p. 19) and occurred when the participants' learning would not be disadvantaged (BERA, 2018, p. 19).

Data gathered were anonymised, stored confidentially on the school's server and deleted following analysis (BERA, 2018, pp. 21–25; Data Protection Act 2018).

## Data analysis strategy

The purpose of the data analysis was to identify whether the intervention had an impact on social anxiety and social interactions between the participants. Initial analysis of the intervention's impact was quantitative (Cresswell, 2012, p. 175), reflecting on the frequency of entries in the behaviour log. Second, the analysis of the researcher's informal class teacher observations and the views of the participants' parents occurred, through reading through the notes twice and reflecting on how they demonstrated any impact on the SCIDs and anxiety of the participants.

Finally, coding and content analysis of the field notes were undertaken (Thomas, 2017, pp. 251–252), reducing the qualitative data into fewer categories or codes (Webber, 1990, p. 15). The field notes were read twice to organise and redact them. During this process, the codes 'eye-contact', 'turn-taking' (Knott et al., 2006, p. 614) and 'self-confidence' were identified. The field notes were then coded using NVivo (Thomas, 2017, p. 253); during this process, 'ability to focus' and 'helping and praising others' arose as additional areas of need. Therefore, the codes were refined and further codes were added (Table 1) and a final coding was undertaken on NVivo. Each of the codes was divided into two categories; positive or negative. After the final coding, the notes were read again and I noted the number of prolonged periods of concentration.

It is important to note that behaviours were identified as positive or negative based on the impact on the participants' social anxiety and ability to communicate with each other effectively, rather than on neurotypical expectations of communication. For example, where the girls interrupted each other because they were excited but it did not impact negatively on social interactions, it was not marked as negative.

**TABLE 1** Codes used during NVivo content analysis and examples.

| Theme | Codes |
|---|---|
| Focus | *Ability to focus on a social task*<br>Positive: working collaboratively, focussing on the task<br>Negative: being distracted without an obvious cause, for example throwing beads, verbal stimming, being distracted by the environment |
| Checking in | *Visual checking-in (eye-contact)*<br>Positive: visually checking a fellow participant is ready for the next instruction or bead<br>Negative: passing on a bead or saying the next instruction without visually checking to ensure the participant was ready |
| | *Verbal checking-in (clarifying)*<br>Positive: asking for the next instruction or bead<br>Negative: talking over each other, talking over each other due to not waiting for someone to finish speaking before speaking |
| Leadership | *Helping others*<br>Positive: Offering to help others, helping others<br>Negative: Doing things for others without asking or being asked, not helping others when they are stuck, laughing at others when they cannot do something |
| | *Praising others*<br>Positive: Complimenting other participants, for example that they have made a good bracelet or are doing good listening<br>Negative: Saying that a fellow participant will not be able to do something, laughing at somebody for a perceived weakness |
| Self-confidence | *Self-confidence*<br>Positive: A participant saying they are good at something<br>Negative: A participant saying they cannot do something, are not good at something, giving up, being jealous of others, being too nervous to speak to fellow participants |

# DISCUSSION OF DATA AND FINDINGS

## Overall impact

The positive effect on the social anxiety and interactions of the participants was evidenced by the reduction in observed social difficulties; the initial social difficulties log noted 16 instances of SCIDs and the final log noted only two instances. It is important to note the second log occurred during a heatwave; playtimes were limited or indoors and one of the participants was absent for 2 days, which may impact upon the results.

As the class teacher, during informal observations of the children, the lead researcher noticed a reduction in the frequency and severity of disputes between the pupils. Prior to the intervention taking place, no instances of the three participants playing successfully with each other had been observed and friendship difficulties (Cook et al., 2017, p. 303). These often involved the children pairing up and avoiding or excluding the third participant, which ended in one or more of the girls withdrawing (Sedgewick & Pellicano, 2019, p. 129) or having a meltdown (Wild, 2019, p. 74). Sometimes, the marginalised child would attempt to play with other children with the support of the teacher; this was rarely successful as all of the participants found initiating and sustaining conversations with their peers challenging (Calder et al., 2013, p. 298). In addition, the participants demonstrated fixed mindsets and struggled to join an already established game not aligned with their interests (Happé, 2019, p. 13). These instances were much less frequent post-intervention and none were recorded on the social difficulties log.

Not only was there a reduction in instances of social difficulty, but also an increase in the frequency and duration of instances where all three participants played together. On one occasion, after the second cycle of intervention, all three girls were observed playing together on the playground and taking turns speaking, for over 5 min. When one child decided to leave the group, she skipped off to play by herself for a period of time. This implied that the social anxiety of at least one participant had reduced; they seemed more able to tolerate the other two playing without becoming emotionally dysregulated or jealous. However, this was not the case for all of the participants and jealousy (Farooq et al., 2020) underpinned the social difficulties observed after this intervention; one of the two incidences recorded on the second social difficulties log involved one participant telling another to punch the third. Future iterations of this intervention could benefit from focussing on self-confidence and self-esteem.

A reduction in social anxiety was mentioned by the parents of all participants. Initially, all parents shared that their child's SCIDs in school were causing the child to feel anxiety (Dubin, 2009, pp. 86–87; White & Roberson-Nay, 2009) and sometimes reluctance to come into school. One parent commented that their child would cry for up to 2 h in the evening due to social difficulties that had happened during the school day. Towards the end of the intervention, all

parents noted an improvement in the frequency and duration of any periods of emotional dysregulation at home linked to events in school, although these were still occurring and of a concern to at least one of the parents. This demonstrates that the impact was observed beyond the school environment, which is important as it suggests a decrease in social anxiety rather than an increase in masking (Grant, 2019, p. 32); an important factor to consider as all parents noted a significant difference in their child's behaviour between home and school.

## During the intervention

Overall, as the weeks progressed, there was a reduction in the number of codes related to negative social communication behaviours and an increase in the number relating to positive social communication behaviours (Table 2). The most noteworthy increase in positive behaviours happened in verbal checking-in and the most noteworthy decrease was in negative instances relating to self-confidence (Table 3). This suggests that the intervention was beginning to have a positive effect on both social anxiety and social interactions for the participants.

Perhaps, the most significant finding was the improvement in verbal checking-in (Table 3). There was also a small decrease in negative visual checking-in codes and small increase in the corresponding positive codes. In the first two sessions, the children rarely checked, visually or verbally, if their fellow participants were ready or had the correct bead (Schnee, 2020). However, during the second cycle, there were numerous examples of the children clarifying; 'This one?', 'And orange?', 'Now what?'. Although there were occasional adult prompts regarding visual and verbal turn-taking, for the most part, the children's improvement seemed to arise independently. It may be that as the children became more familiar with the structure of the intervention, immersion in a task aligned with their interests may have allowed them to enter a 'flow state' (McDonnell & Milton, 2014, cited in Leadbitter et al., 2021, p. 4), where visual and verbal checking-in came more naturally. This was evidenced by an increase in prolonged periods of collaboration (Table 4). However, this would not account for the improvement in social interactions outside of the intervention as noted on the social difficulties log. Further research into why verbal and visual checking-in skills improved may be beneficial in understanding the efficacy of the intervention.

There was a note-worthy decrease in negative instances relating to self-confidence. It may be that as the intervention progressed, the familiarity helped the children to feel confident (Lawson, 2019, p. 184). Alternatively, it may be that feeling

**TABLE 2** Overall number of coding references per intervention session by positive or negative attribute.

| | Number of coding references | | | | | |
|---|---|---|---|---|---|---|
| **Attribute** | **Week 1** | **Week 2** | **Week 3*** | **Week 4** | **Week 5*** | **Week 6** |
| Negative | 17 | 16 | 7 | 9 | 2 | 4 |
| Positive | 1 | 12 | 17 | 28 | 7 | 32 |

*1 participant was absent in week 3 and week 5.

**TABLE 3** Number of coding references per intervention session by code and sentiment.

| | | Number of coding references | | | | | |
|---|---|---|---|---|---|---|---|
| **Code** | **Sentiment** | **Week 1** | **Week 2** | **Week 3** | **Week 4** | **Week 5** | **Week 6** |
| Ability to focus | Negative | 1 | 2 | 2 | 3 | 0 | 0 |
| | Positive | 0 | 2 | 0 | 0 | 0 | 0 |
| Visual checking-in | Negative | 4 | 3 | 0 | 1 | 0 | 0 |
| | Positive | 1 | 1 | 0 | 3 | 0 | 3 |
| Verbal checking-in | Negative | 3 | 2 | 0 | 0 | 0 | 0 |
| | Positive | 0 | 3 | 4 | 11 | 5 | 19 |
| Helping others | Negative | 0 | 0 | 0 | 2 | 0 | 2 |
| | Positive | 0 | 4 | 6 | 6 | 1 | 2 |
| Praising others | Negative | 0 | 0 | 1 | 1 | 0 | 0 |
| | Positive | 0 | 1 | 0 | 2 | 0 | 2 |
| Self-confidence | Negative | 9 | 9 | 4 | 2 | 2 | 2 |
| | Positive | 0 | 1 | 5 | 2 | 0 | 2 |

*Note*: 1 participant was absent in week 3 and week 5.

**TABLE 4** Number of noted instances of prolonged periods of concentration** by week.

| | Number of coding references | | | | | |
|---|---|---|---|---|---|---|
| | Week 1 | Week 2 | Week 3* | Week 4 | Week 5* | Week 6 |
| Prolonged period of concentration | 0 | 0 | 2 | 4 | 1 | 4 |

*Note: 1 participant was absent in week 3 and week 5. **A prolonged period of concentration was taken to be any instance where the children could get from the 'designer's' instruction to the 'jewellery maker' adding the bead with no distractions or lapses in focus.

a sense of achievement in creating their jewellery (Legoff & Sherman, 2006, p. 319) or the opportunity to participate in an activity aligned with their interests (Leadbitter et al., 2021, p. 4) increased the self-esteem of the participants. However, there was not a corresponding increase in positive displays of self-confidence. This could be due to the limited number of sessions in the intervention. Alternatively, the children may have needed more direct modelling and praise from an adult and their peers to help combat any pre-existing maladaptive schemas relative to self-worth (Dubin, 2009, pp. 86–87).

There was little impact on the leadership social skills of helping or praising others. This could be due to the fact it was not explicitly modelled by an adult, although there was one participant who demonstrated these behaviours throughout the cycle. It is also worth noting that in the last two sessions, there were less opportunities for the children to help each other; due to their improvement in visual and verbal-checking in, they had significantly fewer difficulties in creating their jewellery items collaboratively.

## DISCUSSION

Based on class teacher observations, the 'Jewellery Club' adaptation of Lego Therapy appeared to have a greater observable positive impact on social interactions and social anxiety in 6 weeks than prior interventions had over much longer periods of time. This improvement may be due to the fact that, unlike previous interventions, it was aligned with the gender-influenced (Carpenter et al., 2019, p. 4) interests of the participants (Leadbitter et al., 2021, p. 4); prior to the intervention taking place, the participants were asked what they would like to do; all three children unanimously chose jewellery making. Additionally, previous interventions were undertaken by teaching assistants, whereas the 'Jewellery Club' intervention was run by a qualified teacher currently working towards the National SENCO award, which may have impacted on the efficacy of the interventions.

A key issue identified during this process was the difficulty experienced by the participants when interacting with more than one person at the same time. This was compounded by the fact that all three children wanted to play together, as evidenced by their continued attempts to do so. On one occasion, during an incidence recorded on the social difficulties log, one participant mentioned that she struggled to play with more than one other person; this child only ever played with one other child and their play was predominately non-verbal. The reduction in social anxiety and emotional regulation observed by parents and staff could be in part due to the children learning communication skills to play more harmoniously as a group of three due to their improvement in visual and verbal checking-in skills as precursors to turn-taking and collaborative play. It may also be the case that learning social communication skills whilst completing a gratifying activity (Legoff & Sherman, 2006, p. 319) aligned with their gender-influenced interests, helped to reduce anxiety.

Although the frequency of social difficulties observed decreased, the nature of the difficulties remained consistent; as the three participants would often seem jealous of one another. This jealousy may have been caused by the frequent ostracising of one of the participants; low self-esteem often underpins jealousy (Farooq et al., 2020). Although the number of negative self-confidence codes decreased as the intervention progressed, there was not a corresponding rise in the number of instances of positive displays of self-confidence. During session 3, the lead researcher trialled ending the session with compliments for the participants, but they struggled to engage with this. It may have been that this was a new situation and the children did not understand how they should react (Lawson, 2019, p. 183). Therefore, any future attempts to recreate this intervention may benefit from incorporating techniques to build self-confidence (Knott et al., 2006, p. 616).

During session 3 of the intervention, it became apparent that the two participants present were not able to reflect on how the third might be feeling as she was not there and would not get a bracelet. They suggested the missing participant may be feeling 'shy' or 'happy', which was how they were feeling at the time. This could be an additional reason why two of the children often paired up and ostracised the third participant; they may not have been able to understand how this would make the other child feel (Tutt, 2019, p. 63). A future area to focus on for the intervention could be understanding and interpreting the emotions of others.

The intervention also provided an opportunity to address the SCIDs of the participants in a safe and positive environment as opposed to dealing with them in the moment. Prior to the intervention, when attempting to address turn-taking difficulties in the moment, one participant, who was particularly withdrawn slowly backed away and looked at the floor. The attempt to address the difficulties in the moment may have made her feel uncomfortable (Dubin, 2009, pp. 86–87; White & Roberson-Nay, 2009). However, as part of the intervention it was possible to address issues such as verbal and

visual checking-in. Once the children had settled in to the routine of the intervention, they were eager to participate, implying the intervention could be a more conducive environment in which to address SCIDs. It is important to note that as the intervention was weekly, it would not be possible to address all SCIDs through the intervention; issues involving physical actions towards others need addressing immediately. Nevertheless, the intervention may be a useful tool to unpick the causes of SCIDs and help the participants to build skills to address these.

It is important to note that there are several limitations to this study. These include the possibility of observer bias (Cohen et al., 2018, p. 302), given that the lead researcher was also the class teacher.

## CONCLUSION

Overall, the adaptation of the Lego Therapy intervention appeared to show initial signs of a positive impact on social anxiety and interactions between the 7-year-old girls with social communication interaction difficulties. Given that these are two significant challenges facing girls with undiagnosed SCIDs (Knott et al., 2006; White & Roberson-Nay, 2009), this implies that it could be a valuable early intervention tool (Lupindo et al., 2022). As this intervention requires minimal resources and can occur in a school setting, it can be undertaken with participants who do not currently have an autism diagnosis, which is valuable considering the underdiagnosis of autistic females (Dworzynski et al., 2012, p. 793; Petrou et al., 2018, p. 32). The intervention had a particular impact in reducing instances of low self-esteem and increasing verbal and visual checking-in skills as a precursor to conversational turn-taking, although it had little if any effect on leadership skills.

Further exploration of how the intervention could be adapted to support an improvement in self-confidence, identifying the emotions of others and leadership skills would be valuable in improving the efficacy and multifaceted nature of this intervention. A deeper investigation as to why this intervention improved the verbal and visual checking-in skills may aid with this endeavour.

The findings of this research further highlight the importance of ensuring interventions allow for the opportunity to be aligned with the interest of the participants (Legoff et al., 2014, p. 12). This is particularly true where existing interventions are based on male-biased samples, recognising the fact that autistic boys are more likely to receive a diagnosis (Dworzynski et al., 2012, p. 793; Petrou et al., 2018, p. 32). Practitioners and researchers may consider further investigation into the nature of activities engaged in during interventions and whether the nature of the activities is gendered and whether they reflect participants' interests.

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### CONFLICT OF INTEREST STATEMENT
The authors declare no conflict of interest.

### DATA AVAILABILITY STATEMENT
Due to the nature of the research and the participants, supporting data is not available.

### ETHICS STATEMENT
Ethical approval was granted through the ethics committee of the university School of Education.

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