A randomised controlled trial of a computerised intervention for children with social communication difficulties to support peer collaboration

Suzanne M. Murphy [a,*], Dorothy M. Faulkner [b], Laura R. Reynolds [c]

[a] Institute for Health Research, University of Bedfordshire, Putteridge Bury, Hitchin Road, Luton, Bedfordshire LU2 8LE, United Kingdom
[b] Faculty of Education and Language Studies, Open University, Walton Hall, Milton Keynes MK7 6AA, United Kingdom
[c] Child and Adolescent Mental Health Services, Beech Close Resource Centre, Beech Road, Dunstable, Bedfordshire LU6 3SD, United Kingdom

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ABSTRACT

An intervention aiming to support children with social communication difficulties was tested using a randomised controlled design. Children aged 5–6 years old ($n = 32$) were tested and selected for participation on the basis of their scores on the Test of Pragmatic Skills (TPS) and were then randomly assigned to the intervention arm or to the delayed intervention control group. Following previous research which suggested that computer technology may be particularly useful for this group of children, the intervention included a collaborative computer game which the children played with an adult. Subsequently, children's performance as they played the game with a classmate was observed. Micro-analytic observational methods were used to analyse the audio-recorded interaction of the children as they played. Pre- and post-intervention measures comprised the Test of Pragmatic Skills, children's performance on the computer game and verbal communication measures that the children used during the game.

This evaluation of the intervention shows promise. At post-test, the children who had received the intervention, by comparison to the control group who had not, showed significant gains in their scores on the Test of Pragmatic Skills ($p = .009$, effect size $r = -.42$), a significant improvement in their performance on the computer game ($p = .03$, $r = -.32$) and significantly greater use of high-quality questioning during collaboration ($p < .001$, $r = -.60$). Furthermore, the children who received the intervention made significantly more positive statements about the game and about their partners ($p = .02$, $r = -.34$) suggesting that the intervention increased their confidence and enjoyment.

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1. Introduction

Children who experience difficulties with social communication and language skills are known to have problematic peer relationships (Ellis Weismer, 2013). They are less well-accepted than typically-developing children (Laws, Bates, Feuerstein, Mason-Apps, & White, 2012) and can be at greater risk of bullying (Conti-Ramsden & Botting, 2004). Emerging evidence also suggests that they are less likely to be able to benefit from the collaborative activities with peers that are a common feature of educational settings (Brinton, Fujiki, Montague, & Hanton, 2000; Murphy, Faulkner, & Farley, 2014).

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* Corresponding author. Tel.: +44 01582 743461.
E-mail address: suzanne.murphy@beds.ac.uk (S.M. Murphy).

However, research into how to improve collaborative working for these children is scarce. We report here a randomised controlled trial of an intervention to support young children (ages 5–6 years old) with social communication difficulties to participate in collaborative interaction to address this limited literature.

1.1. Characteristics of children with impairments in social communication

The difficulties experienced by children with social communication impairments include the use of linguistic context to comprehend a speaker's meaning (pragmatic language skill) and, more broadly, application of knowledge of conventional norms and expectations from the wider society in which the child lives to understand and relate to others (Norbury, 2014). For example, such children are likely to find it difficult to take turns during conversation, to maintain a topic of conversation appropriately, make inferences, understand non-literal language such as jokes or sarcasm, repair communication breakdowns and may often be non-responsive or respond irrelevantly to conversational partners.

Children with difficulties with the use of language in social communication are a heterogeneous group and encompass both clinical and non-clinical categories. Clinical groups include the categories of 'Language Impairment' (also commonly known as 'Specific Language Impairment'), 'Social (Pragmatic) Communication Disorder' and 'Autism Spectrum Disorders' defined in DSM V (Diagnostic and Statistical Manual of Mental Disorders, American Psychiatric Association, 2013). Children experiencing difficulties with social communication are not limited to those covered by these DSM V diagnoses. Social communication and pragmatic language difficulties have also been shown to be associated with other clinical populations such as ADHD and conduct disorder (Norbury, 2014) and with non-clinical groups such as shy children (Coplan & Weeks, 2009; Mewhort-Buist & Nilsen, 2013). It has also been reported that social communication disorders are severely under-diagnosed, particularly in children of low socio-economic status (Bishop & McDonald, 2009; Donno, Parker, Gilmour, & Skuse, 2010). Although exact figures are sparse, it is estimated that approximately two-thirds of children with speech, language and communication needs do not seek help from services (Law, Reilly, & Snow, 2013). In view of the overlapping conditions, co-morbidity, under-diagnosis and impact of societal factors in the area of language impairment, Law et al., (2013) have argued that there is a need to take a more inclusive approach that targets a broader spectrum of children, rather than limiting itself to diagnosed children in receipt of healthcare services and/or special educational provision.

1.2. Benefits of collaborative working

Collaborative work is generally viewed by educators as a valuable activity for children that supports learning and development as well as being a preparation for working cooperatively in the adult world (Fawcett & Garton, 2005; Joiner, Faulkner, Littleton, & Miell, 2000). A number of collaborative activities between children (such as collaborative learning, cooperative learning or peer tutoring) now commonly take place in classrooms and have generally been judged to be beneficial in terms of improved learning (e.g., Azmitia, 1998; Johnson & Johnson, 2009; Tolmie et al., 2010). As well as educational benefits, collaborative working has been claimed to improve peer relations and facilitate children's feelings of belonging (Johnson-Pynn & Nisbet, 2002; Tolmie et al., 2010). However, group and/or dyadic work is not invariably useful, only collaborations where children are actively engaged and that are characterised by high-quality questioning, explanation, clarification of ideas, discussion and generally positive affect have been found to be productive (Howe, 2010). Thus, it would appear that children with social communicative impairments would find such activities challenging but potentially would have much to gain from opportunities to collaborate, if these can be designed to cater for their needs. This is especially true bearing in mind the negative long-term impact into adulthood of such impairments on academic achievement, social relationships and mental health (Whitehouse, Watt, Line, & Bishop, 2009).

1.3. Social communication difficulties and collaborative work

One would anticipate that children with social communication difficulties would find it particularly challenging to participate in collaborative activities with their peers. Little is known about the precise ways in which social communication difficulties impact on collaborative contexts for young children (aged 3–7) although a few initial studies have begun to explore this question (Brinton et al., 2000; Kimhi & Bauminger-Zviely, 2012; Murphy et al., 2014).

Brinton et al. (2000) examined collaboration between language-impaired children (ages 6–7 years old) in triads with two typically-developing classmates. The triads were asked to collaborate on activities such as the construction of a toy vehicle, and production of a collage and a cardboard model. Although this was a preliminary study (only $n = 6$ language-impaired children), the authors reported that four of the language-impaired children presented a challenge to cooperative work, displaying either aggressive or withdrawn behaviours in this context. They noted that the social demands of the task limited the children's inclusion and participation as much as the linguistic demands.

Kimhi and Bauminger-Zviely (2012) investigated collaborative problem-solving in children aged 3–6 years old and compared high-functioning children with autism spectrum disorders ($n = 28$) with age-matched typically-developing children ($n = 30$). Children were observed whilst solving balance scale problems working in pairs. The authors found that the children with autism spectrum disorders were slower to solve the problems, showed more irrelevant behaviours and shared less, by comparison to the typically-developing children.