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A Review of Play Interventions for Children with Autism at School

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Play is an important aspect of children's development and its value to education has been widely explored. However, play in children with disabilities and especially children with autism may be restricted when compared to that of their non-disabled peers of similar age and abilities. Moreover, play has been neglected to a certain extent in school practice due to the focus many teachers place on academic attainments and the difficulty in engaging autistic children in play activities. Children spend most of their time in schools as opposed to attending interventions individually. School based research can improve the educational outcomes for autistic children and, therefore, there is a pressing need for more research to be conducted in school settings. The current literature review aims to: (i) identify empirical studies using interventions to develop play skills in autistic children at school, and (ii) explore the features of play skills targeted in these studies. A systematic search of two electronic databases: (i) PsycINFO, and (ii) Education Resources Information Center (ERIC) has been conducted between 2000 and 2014. Fourteen papers were collected and the findings suggest that a significant number of studies have been conducted in schools exploring a wide range of play skills. Strengths and limitations of the reviewed studies are given as well as implications for practice and future research. Conclusions are discussed in the light of the high ecological validity of real world studies and the need to bridge the gap between academic research and school practice.

Keywords: autism; school-based interventions; play skills; teachers; teaching staff; inclusive environments; ecological validity; educational research; quality indicators

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Introduction

Play is pleasurable, voluntary and intrinsically motivated, flexible with non-literal orientation, it requires active engagement and the focus is on the process than the end product (Wolfberg, 1999). It is fundamental in children's socio-emotional and cognitive development, in education and learning (Siraj-Blatchford, 2009). Play is also considered to be an integral part of early childhood (Trevarthen, Aitken, Papoudi, & Robarts, 1998) and of children's education (Bordova, 2008). Different theories emphasise how play contributes to child development and learning. Infants and caregivers show signs of interactive play through face-to-face interaction from the first months of life and near the first year functional play and before the second year pretend play. Later on, play is exhibited not only in children's solitary activities but also in peer relationships (Trevarthen et al.). Pretend play is at this period dominant in children's play and is associated with the capacity of symbol use and therefore with the development of language (Vygotsky, 1966). As play is part of children's developmental trajectory, it is used in educational settings to foster children's learning in early years (Siraj-Blatchford).

Children with autism experience difficulties in play from infancy (Charman et al., 1997), in spontaneous interactive social play and (Chawarska & Volkmar, 2005; Wimpory, Hobson, Williams, & Nash, 2000), later on, in social play (Jordan, 2003) or in group play (Wolfberg & Schuler, 2006). These difficulties are intricately linked with the nature of autism which involves substantial difficulties in social interaction, in communication and in symbolic thinking (Wing & Gould, 1979). Children with autism may show difficulties in functional and in symbolic play, in peer play and in forming friendships. According to the recent *Diagnostic and Statistical Manual DSM-V5* (American Psychiatric Association, 2013) the play of children with autism can be

considered as stereotyped and/or repetitive with an interest in the sensory qualities of the objects. Regarding the social and imaginative aspect of play, children with autism are likely to show difficulties in sharing imaginative play and in being interested in peers or in making friends.

Children with autism tend to show differences in the quality and quantity of their play when compared to typically developing (TD) children (Charman et al., 1997) and also to children with other developmental disabilities (Baranek et al., 2005; Rutherford, Young, Hepburn, & Rogers, 2007). It has been documented in various studies that functional play (e.g. push a toy car in garage) and pretend play (e.g. make the sound of a car's wheels) are limited. Emphasis has been given mainly on the study of pretend play in autism and most studies have attempted to clarify the lack or absence of symbolic play and how this is related to theories of autism (Jarrold, 2003). Furthermore, children with autism are unlikely to engage in functionally appropriate play without specific and explicit teaching (Sherratt, 1999; Wolfberg, 1999). They can show some forms of pretend play but they produce fewer novel play acts (Charman & Baron-Cohen, 1997; Jarrold, Boucher, & Smith, 1993) and their play is relatively repetitive and inflexible (Mundy, Sigman, Ungerer, & Sherman, 1986). Children with autism can show some play skills in adult-structured versus free play situations (Charman & Baron Cohen, 1997; Jarrold et al., 1993) and in this way can be scaffolded. Overall, the pretend play of children with autism is varied depending on their cognitive functioning and their linguistic abilities and therefore there is diversity in play reflecting the diversity within the autism spectrum. Furthermore, children with autism have poor quality friendships compared to children without a clinical diagnosis (Bauminger & Kasari, 2000) and even cognitively able children with autism are more

often neglected and rejected by their peers compared to pupils without autism (Humphrey & Symes, 2011) due to difficulties in social interaction and in peer play.

Play can be used as an effective tool in the education of children with autism and it can foster children's participation in inclusive settings. Pupils with autism need support with functional spontaneous communication and language, learning through interaction with peers, social understanding, joint attention, peer interaction and play (Wolfberg & Schuler, 2006; Wong & Kasari, 2012). However, the vast majority of the schools, mainstream or special, do not value the importance of play beyond early years, neither do they cater for the specific difficulties children with autism have in play. Likewise, long lasting theories on the importance of play in the child's development and its contribution to good teaching is violated (Miller & Almon, 2009). A potential reason as to why play is left out from the school might be that many teachers nowadays are not aware of the value of play for children's development and the curriculum is based on teaching academically targeted skills rather than play. A number of researchers have recognised the benefit of engaging children with autism in play at school and have implemented interventions in school settings.

The present review focuses on the use of play as an intervention strategy for children with autism in school settings. The objectives of this review are to: (a) to identify peer-reviewed studies and describe the characteristics of evidence based practices in teaching play skills in children with autism in school settings; (b) to evaluate the effectiveness of play interventions by offering an analysis of these interventions; and (c) to suggest recommendations for future research and practice.

Given the importance of play, along with the time that children with autism spend at school, there is an urgent need for effective evidence-based interventions that

target and promote the engagement with play in school settings. Furthermore, it is important to understand the context that these interventions are applied and evaluate their effectiveness in order to meet the individual needs of children with autism and learn how to maximise the benefit for them by using play as an intervention strategy. Such a review is very much relevant, timely and needed given that there is a limited number of studies on teaching play skills in children with autism combining rigor and ecological validity. The findings of this review can be of great relevance to a number of stakeholders (e.g. practitioners as well as parents and carers of children with autism) as due to their high ecological validity some features of all these interventions can be directly applied at school and at home with minor amendments.

Methodology

Search Procedure

A systematic search of two electronic databases: (i) PsycINFO, and (ii) Education Resources Information Center (ERIC) was conducted in November, 2014 by considering titles and abstracts of the papers. A hand search was also implemented to avoid omissions of substantial papers as some existing play interventions did not appear in the initial search (i.e. intentiplay, lego therapy, interactive play). The terms used were "autism", "play", "intervention", and "school" and/or "class/classroom". The timeframe for the studies to be considered was decided to be between 2000 and 2014 in order to review recent studies and to enlighten the increasing interest and up to date knowledge in the autism educational research field.

Inclusion and Exclusion Criteria

Given that this review is focused on the effectiveness of play interventions in school-based research, it was decided that the most appropriate inclusion and exclusion criteria for the reviewed studies should be the following. Inclusion criteria for each

reviewed study: (a) to consist of empirical data; (b) to be published in a peer reviewed journal; (c) to be published between 2000 and 2014; (d) to be written in English; (e) to involve at least one participant with autism (with or without intellectual disability-ID/other difficulties); (f) to consider a play intervention as the independent variable (i.e. tool/medium to teach askill); (g) to employ an intervention in order to teach, at least partially, clearly defined play skills (dependent variable/s); (h) to be conducted at least partially at school; and (i) to consider an intervention which has been used for at least two sessions. Therefore some papers were rejected on the basis of the following exclusion criteria: (a) they explored interventions traditionally targeting other skills to teach play (e.g. social stories or activity schedules); (b) they involved interventions targeting other areas of development apart from play (e.g. joint attention, social initiations and responses); (c) they explored play assessments (one or two sessions to evaluate and not teach play skills); and (d) they were review papers, books, conference proceedings or papers published in professional journals.

Reliability of Search Procedure and Inter-Rater Agreement

The first author conducted the initial search and came up with 19 papers meeting the above inclusion criteria. Then in order to obtain a certain degree of inter-observer reliability, both authors checked the 19 papers in full to confirm that the inclusion criteria were met. At this stage, five papers were rejected by both authors amounting the total number of papers to be reviewed to 14. The inter-observer agreement between the two authors was 100%.

Data Extraction

The 14 papers were thoroughly scrutinised and each included study was analysed in terms of the following features: (a) participants' characteristics (i.e. number, gender, age and diagnosis), (b) research design (i.e. methodology, data collector and strength

of the study) and (c) intervention (i.e. name, theoretical underpinnings, frequency and duration, materials needed, interventionist, setting, targeted play areas, generalisation and effectiveness). The summary of these studies is presented in Table 1.

[t] Insert Table 1 near here/[t]

The authors of this review decided to follow the definitions used by the authors of the reviewed papers regarding additional difficulties of the participants (e.g. language difficulties, ID, delays in motor coordination, hearing impairment). A classification of participants into high, moderate and low cognitive functioning based on communication/ language skills and IQ scores (Reichow & Volkmar, 2010) might have been helpful but not all the reviewed studies provided the necessary information and this was not possible. It is important to mention at his point that in studies, which included participants with other disabilities apart from autism, only data for participants with a diagnosis of autism have been extracted. Similarly for studies, which targeted skills other than play, only data on the play skills were considered and studies which were conducted in multiple settings only data from the school setting were extracted.

The strength of each study was evaluated using the evaluative method for determining evidence-based practices in autism (Reichow, Volkmar, & Cicchetti, 2008). This method considers a number of primary and secondary quality indicators for single subject or group research in order to assess the rigor of each study. For single subject research, primary quality indicators refer to: (a) participant characteristics, (b) independent variable, (c) dependent variable, (d) baseline condition, (e) visual analysis and (f) experimental control, whereas secondary quality indicators entail: (a) inter-

observer agreement, (b) Kappa, (c) fidelity, (d) blind raters, (e) generalisation and/or maintenance, and (f) social validity. For group research, primary quality indicators refer to: (a) participant characteristics, (b) independent variable, (c) comparison condition, (d) dependent variable, (e) link between research question and data analysis, and (f) use of statistical tests. Secondary quality indicators involve: (a) random assignment, (b) inter-observer agreement, (c) blind raters, (d) fidelity, (e) attrition, and (f) generalisation and/or maintenance, (g) effect size, and (h) social validity. Based on the above quality indicators the reviewed studies were rated as having strong, adequate or weak research strength. In order to be classified as strong, the studies had to receive high quality ratings on all primary quality indicators and showed evidence of at least three (for single subject research) and four (for group research) or more secondary quality indicators. To be classified as having adequate strength, studies had to receive high quality ratings on four or more primary quality indicators (no unacceptable rating on any of the primary quality indicators) and showed evidence of at least two secondary quality indicators. Studies classified as having weak rigor received fewer than four high quality ratings on primary quality indicators or showed evidence of fewer than two secondary quality indicators.

Results

Findings are presented as per the extracted categories. Table 1 gives detailed information for all categories in each paper.

Participants' Characteristics

Within the 14 reviewed studies a total of 82 children with autism received play intervention at school. The age of participants ranged from 2.5 to 12 years old with an average of 6 years old. The gender of the majority of the participants was male. Of the 51 pupils whose gender was provided by the authors of the empirical studies 41 were

boys (80%) and 10 were girls (20%). The gender was not possible to be extracted for 31 pupils due to lack of information. The diagnosis for all pupils considered for this review was autism; 47 of them (57%) had an additional diagnosis of ID and/or language/communication delay, hearing impairment, motor difficulties. A study (Lu, Petersen, Lacroix, & Rousseau, 2010) did not provide the exact number of participants with additional delays in motor coordination and impaired hearing.

Research Design

There was a great variation in the research designs employed by the researchers ranging from rigorous Randomized Control Trial (RCT) (Lawton & Kasari, 2012) to descriptive case studies (François, Powell, & Dautenhahn, 2009; Parker & O' Brien, 2011) and action research (Lu et al., 2010). One study employed an ABA design (Argyropoulou & Papoudi, 2012) and the rest studies used different types of AB designs (simple AB, multiple probe multiple baseline across participants and settings). In five of the 14 reviewed studies, the teaching staff working with the children irrespectively of the study collected the research data. In two studies (Argyropoulou & Papoudi, 2012; Miltenberger & Charlop, 2014), the teachers had the role of the researchers and data were exclusively collected by them whereas in three other studies (Liber, William, & Symon, 2008; Parker & O'Brien, 2011; Stagnitti, O'Connor, & Sheppard, 2012) teaching staff were involved to a certain extent in the data collection process (e.g. to assess children's skills or to check inter-observer reliability). Eleven of these studies used six or fewer participants.

Three studies (Dykstra, Boyd, Watson, Crais, & Baranek, 2012; Miltenberger & Charlop, 2014; Nelson, McDonnell, Johnston, Crompton, & Nelson, 2007) were classified as providing strong report strength on the basis of the classification by Reichow et al. (2008). Another three studies (Lawton & Kasari, 2012; Liber, William,

& Symon, 2003; Yang, Wolfberg, Wu, & Hwu, 2003) were classified as providing adequate research report strength whilst the majority of the studies (n = 8) were given weak strength mainly because: (a) they failed to provide adequate information on participants' characteristics (e.g. François et al., 2009; Thomas & Smith, 2004), (b) they did not describe independent and dependent variables with operational and replicable precision (e.g. Lu et al., 2010; Parker & O' Brien, 2011), or (c) they did not cater for secondary quality indicators such as treatment or procedural fidelity, blind raters, kappa and social validity (e.g. Argyropoulou & Papoudi, 2012; Hine & Wolery, 2006).

Intervention

Theoretical Underpinnings

A number of interventions were used to teach play skills in children with autism. Classifying these interventions in unanimously accepted categories can be a challenging task. This paper follows Ingersoll & Dvortcsak's (2006) classification system which has two categories: (i) behavioural/naturalistic, and (ii) developmental/relationship-based. In a nutshell, behavioural/naturalistic interventions are based on the assumption that new skills should be taught in an environment where the antecedent stimuli are clear and systematic reinforcement follows a correct response (Cooper, Heron, & Heward, 2007), whereas developmental/relationship-based approaches are based on the assumption that children with autism follow the developmental trajectories of their TD peers and suggest to practice the milestones they missed (Greenspan & Wieder, 1998). In the former case teaching is taking place in highly structured environments and in the latter case learning is achieved through strong affect-laden relationships between the child and the adults (Ingersoll, Dvortcsak, Whalen, & Sikora, 2005). Some of the reviewed studies employed interventions

deriving from the behavioural/naturalistic approaches (Hine & Wolery, 2006; Liber et al., 2008; Licciardello, Harchik, & Luiselli, 2008; Miltenberger et al., 2014) but most studies either used interventions with clear links to developmental/relationship-based approaches (Argyropoulou & Papoudi, 2012; François et al., 2009; Lu et al., 2010; Parker & O' Brien, 2011; Yang et al., 2003) or approaches fitting somewhere in between the two broad categories (Dykstra et al., 2012; Lawton & Kasari, 2012; Nelson et al., 2007; Stagnitti et al., 2012; Thomas & Smith, 2004) combining imitation and following the child's lead (developmental/relationship-based techniques) with prompting and modelling (behavioural/naturalistic strategies).

Duration and Materials

Half of studies (n = 7) failed to give detailed description of either the frequency or the duration of the play intervention they used (Dykstra et al., 2012; Hine & Wolery, 2006; Lawton & Kasari, 2012; Liber et al., 2008; Licciardello et al., 2008; Miltenberger & Charlop, 2014; Nelson et al., 2007). The remaining studies reported that the duration of the intervention ranged from two weeks to six months and it was delivered once or twice a week. Only one study (Thomas & Smith, 2004) gave daily input to their participants for two weeks. The average duration per session was 50 minutes (Dykstra et al., 2012; Parker & O' Brien, 2011; Stagnitti et al., 2012; Yang et al., 2003) whereas Argyropoulou and Papoudi (2012) and Thomas and Smith (2004) gave much shorter sessions, 10-15 minutes and 5 minutes respectively. All studies reviewed, apart from one study, which employed a dog-like robot (François et al., 2009), used materials which can be found in Early Years or Primary school settings (e.g. sand trays, figurines, outdoor equipment such as swings and climbing structure, video camera, sport equipment).

Interventionist

In eight of the reviewed studies staff (e.g. teachers, teaching assistants-TAs, therapists) working already in the setting conducted the intervention (Dykstra et al., 2012; Lawton & Kasari, 2012; Liber et al., 2008; Licciardello et al, 2008; Miltenberger & Charlop, 2014; Nelson et al., 2007; Stagnitti et al., 2012). It is worth mentioning here that in two studies the researchers trained not only the teaching staff but also TD peers (Nelson et al., 2007) or SEN peers (Liber et al., 2008) in the intervention. In the rest of the studies, the researchers, art therapists, educational psychologists or counsellors implemented the interventions.

Setting

Seven out of 14 reviewed studies were conducted in mainstream settings (Argyropoulou & Papoudi, 2012; Hine & Wolery, 2006; Licciardello et al., 2008; Lu et al., 2010; Nelson et al., 2007; Thomas & Smith, 2004; Yang et al., 2003), five in special settings (François et al., 2009; Lawton & Kasari, 2012; Liber et al., 2008; Miltenberger & Charlop, 2014; Stagnitti et al., 2012) and two studies did not give enough information about the type of the setting the intervention took place (Dykstra et al., 2012; Parker & O' Brien, 2011).

Targeted Play Areas

Six studies targeted social play interactions including initiations and responses during play and joint engagement (Argyropoulou & Papoudi, 2012; Lawton & Kasari, 2012; Liber et al., 2008; Licciardello et al., 2008; Nelson et al., 2007; Thomas & Smith, 2004). Five studies focused on teaching symbolic or pretend play (Dykstra et al., 2012; François et al., 2009; Lu et al., 2010; Stagnitti et al., 2012; Yang et al., 2003). In two studies (Hine & Wolery, 2006; Thomas & Smith, 2004) children were taught specific play scripts and actions (e.g. gardening or cooking).

Generalisation

Seven studies (50% of the total reviewed studies) explored at least to a certain extent the generalisability of the learnt skills. The majority of them observed children post intervention beyond the primary aim of the intervention (Argyropoulou & Papoudi, 2012; Hine & Wolery, 2006; Miltenberger & Charlop, 2014; Parker & O'Brien, 2011). In two of them (Liber et al., 2008; Thomas & Smith, 2004) the researchers explored whether the learnt skills were present during different times of the day and one study (Miltenberger & Charlop, 2014) investigated the ability of only one participant to generalise the learnt skills across people (i.e. staff working in the setting). Furthermore, Nelson et al. (2007) collected data for a maintenance phase of 4 weeks for two of their participants.

Effectiveness

Twelve of the studies reported positive findings whereas only two found mixed results. Argyropoulou and Papoudi (2012) found mixed results during the follow up stage; the child's responses to his peer remained high in frequency but his initiations decreased at follow up. Miltenberger and Charlop (2014) reported mixed findings in terms of the generalisability of their results; only one of their three participants showed an increase in his group play skills with a range of people at the behavioural treatment centre, where the study took place. A number of studies reported collateral improvements in areas which were not targeted initially. For example, Lu et al. (2010) found gains beyond the creative and symbolic play; more precisely, they reported improvements in children's verbal expression, social and spontaneous play, flexibility and peer awareness. Stagnitti et al. (2012) showed changes beyond self-initiated and pretend play skills; children in their sample increased their language and decreased social

disconnection. Parker and O'Brien (2011) found that their participants became more friendly towards their peers and had fewer outbursts, although their initial goal was to support their participants to play in more organised ways. Another two studies (Liber et al., 2008; Nelson et al., 2007) while targeting play sequences and initiations reported increases in children's play engagement and imaginative skills.

Discussion

Participants' Characteristics

The majority of the participants in the 14 reviewed studies were male with a diagnosis of autism and additional ID, language/communication difficulties, motor coordination difficulties and hearing loss. This in accordance with current literature showing that autism affects more male than female individuals and > 70% have concurrent conditions (Meng-Chuan, Lombardo, & Baron-Cohen, 2014). More specifically Szymanski, Brice, Lam, and Hotto (2012) found that in a sample of 37,828 deaf and hard hearing children 1.9% had an additional diagnosis of autism. Furthermore, Ming, Brimacombe, and Wagner (2007) examined 154 individuals with autism aged 2 to 18 years old and came to the conclusion that motor difficulties are more common among individuals with autism than their TD peers. The average age of pupils in this review is 6 years old. This is the average participants' age for many reviews of empirical studies and meta-analyses of reviews in the field of autism (DiGennaro Reed, Hyman, & Hirst, 2011; Reichow, 2012). However, more studies regarding outcomes in adolescents and adult life for individuals with autism functioning at the lower end of the spectrum are needed (Levy & Perry, 2011).

Research Design

Internal validity was compromised in most studies due to the lack of a robust experimental design as defined in the rigorous RCT (Cohen, Manion, & Morrison,

2007). This is also depicted in the fact that only two of the reviewed studies came up as having strong research report strength and just four more were classified as having adequate research strength (Reichow et al., 2008). However, most studies have high ecological validity as practitioners can implement some of these processes straightaway. The social validity of most of the studies was also quite significant given that the studies were conducted in natural contexts, people who typically come into contact with the pupils with autism (e.g. teachers, TAs, other therapists) delivered and/or evaluated the intervention and the intervention was cost effective (Reichow et al.). The above findings are not surprising given that only studies which were conducted in schools were considered for this review and this inclusion criterion maximised the studies' chances for high ecological and social validity.

Intervention

Theoretical Underpinnings

Developmental approaches have been widely used to teach children with autism play skills and enable them to use these skills in free play situations (Sherratt & Peter, 2002; Wieder & Greenspan, 2003). Some early intensive behavioural intervention (EIBI) programmes have also targeted play skills as a general curriculum area (Granpeesheh, Tarbox, & Dixon, 2009). Given that literature suggests that eclectic approaches should be promoted for the education of children with autism as there is no intervention to meet all children's needs and preferences (Parsons et al., 2009), professionals should follow the same pattern regardless of their theoretical approach.

Duration and Materials Needed

Many studies failed to provide adequate information regarding the frequency or the duration of the intervention. This can have great implications for school staff who might wish to use the specific intervention but they do not have detailed guidance to

achieve the results described in the relevant studies. However, the majority of the studies provided the frequency and the duration of the intervention, which ranged from 2 weeks to 6 months with an average of once or twice a week sessions. This timeframe seems very reasonable to fit in a busy school environment as opposed to some very intensive models of educating children with autism such as EIBI (Cooper et al., 2007) and Son-Rise (Kaufman, 1994) which promote as many as 40 hours per week. The majority of the studies in this review used materials easily found in a school setting and underscored the importance of using highly motivating materials. This approach enhances to a great extent the ecological validity of the described interventions because in this way teaching staff can implement the intervention fairly straightforward with minimal costs.

The Interventionist/Data Collector

The majority of the studies (n = 9) employed teaching staff to conduct the interventions. This is of crucial importance given the fact that intervention studies in autism research are conducted predominantly in laboratories by trained therapists and researchers (Freeman & Kasari, 2013; Landa, 2007; Roos, McDuffie, Ellis Weismer, Gernsbacher, & Elsenband, 2008). This is the essence of the current review because its aim is to highlight the importance of school-based research. Additionally, the importance of this approach is supported by the current tendency to involve in research people who are working with individuals with autism (Reichow et al., 2008). A number of educational researchers have underlined the role of teachers as natural researchers and the importance of involving them when delivering or evaluating the efficacy of teaching strategies and interventions (Babkie & Provost, 2004; Kincheloe, 2012). Five of the total fourteen reviewed studies involved teaching staff, already working with the children prior to the study, in the data collection process. This is in

agreement with Rose's (2015) argument that teaching staff should be involved in other stages of the research process apart from the delivery of the intervention.

Setting/Generalisation

Seven studies were conducted in mainstream settings, five in special settings and two studies did not give adequate information about the setting. This finding is in disagreement with studies claiming that play is frequently considered to be inappropriate in a school setting because the children should focus on developing academic skills (Siehl, 2001 in Goss & Campbell, 2004) rather than play skills. On a similar note, it is argued that research on play interventions within specialist school settings is limited (Sigafoos, 1999) and there is a need for more research to be carried out in inclusive and mainstream schools (Dykstra et al., 2012). Furthermore, the age group of the pupils in the empirical studies should be also taken into consideration. None of the studies involved pupils older than 12 years old probably because the development of play is associated with the early years and play based interventions are easily applied in Early Year settings (Argyropoulou & Papoudi, 2012). It seems that there is a lack of research carried out in relation to play based interventions during adolescence possibly because play in the later school years is more outdoors and athletic games are considered more appropriate.

A striking finding of this review is that 50% of the empirical studies explored to a certain extent generalisation. These studies catered for generalisation of the learnt play skills to other settings, with other people and at different times of the day. This is an asset of studies being conducted in real world settings as opposed to clinic-based and lab-based studies in which generalisation is still a problem (Owens, Granader, Humphrey, & Baron-Cohen, 2008).

Areas of Play Targeted

With regard to the areas of play the reviewed studies targeted, it is interesting to note that five of them (36%) focused on symbolic and pretend play which has been the topic of a number of reviews for 30 years (Jarrold, 2003; Jarrold et al., 1993; Wulff, 1985). Similarly, social play, which has been of interest to the researchers for a long time now (Jordan, 2003), was the topic for six of the reviewed studies (43%). On the other hand, teaching children with autism specific play scripts and its implications has not been widely researched. Overall, there seems to be a tendency that developmental-relationship based approaches are more widely used to teach symbolic/pretend play and social play skills in children with autism when compared to behavioural approaches which tend to be more effective for teaching play scripts.

Effectiveness of the Study

Twelve of the studies reported positive findings whereas only two found mixed results; Argyropoulou and Papoudi (2012) found mixed results during the follow up stage and Miltenberger and Charlop (2014) reported mixed findings in terms of the generalisability of their results. In addition to this, the people who delivered the intervention conducted the evaluation of the intervention and in most cases raters who were not blind to the treatment condition conducted the inter-observer reliability. The great effectiveness reported by the vast majority of the interventions can be under question because the maturation of the sample in some studies might have influenced the outcome of the intervention and not the intervention per se.

Implications for Future Research and Practice

Future school-based research has to respond to the pressing need for more methodologically rigorous studies in order to evidence the effectiveness and impact of different interventions on teaching play skills in children with autism. One way of

achieving this is to take into consideration the primary and secondary quality indicators (Reichow et al., 2008) as described earlier in this article. Another way to ensure rigor is to aim for high levels of evidence such as preponderance and conclusive (Smith, 1981). A study can be classified at the preponderance level of certainty if it: (a) demonstrates experimental control in a single case research design or uses an experimental group design; (b) provides adequate inter-observer agreement, when applicable (i.e. 20% or more of sessions with mean agreement 80% or higher); (c) operationally defines dependent variables; and (d) provides enough detail to enable replication. A study can be classified at the conclusive level of certainty if it meets the four requirements of preponderance of evidence with an additional attempt to control for confounding variables (e.g. double-blind and placebo controlled).

On the other hand, there is a number of educational researchers who question the applicability of scientific approaches to explore attitudes, behaviours and interventions in real word settings such as schools. There seems to be a constant battle between psychological/lab-based and educational/classroom-based research because the former tends to question the trustworthiness of interpretative/qualitative research in the name of reliability and validity whereas the latter challenge the use of experimental designs and quantitative methods in order to produce findings with ecological validity (Rose, 2015). However, instead of competing with each other educational and psychology researchers need to engage in collaborative research and learn from each other.

The importance of teaching play skills in pupils with autism was emphasised in all interventions with no reference to the importance of teaching the meaning of play to pupils with autism. Indicative is the example of Donna Williams (1992), a woman with autism, who highlights this need.

> Other children played school, mothers and fathers, doctors and nurses. Other children skipped ropes and played with balls or swap-cards. I had swap-cards. I gave them away in order to make friends, before learning that I was supposed to swap them, not to give them away. (p. 22)

Additionally, play skills do not entail that play is experienced as pleasurable by the pupils with autism and "there needs to be an inherent pleasure in play or it ceases to be play" (Sherratt, 1999, p. 26). Practitioners should bear this in mind when teaching play skills in children with autism because play is personal and neuro typical concepts of play should not be enforced. Theories of mediated learning (Rogoff, 1990; Vygotsky, 1966; Wood, Bruner, & Ross, 1976) play a crucial role because children with autism can be guided and scaffolded to engage in play activities. Therefore, children with autism could potentially develop all features of play skills (e.g. cause and effect, social play, functional and symbolic/pretend play) at school and at home taking into consideration their personal preferences and individual needs.

Conclusions

With an increase in autism related conditions affecting a worldwide population of 1% to 2% according to the latest large-scale surveys (Meng-Chuan et al., 2014), it seems very likely for all teachers, from either mainstream or special settings, to have a pupil with autism in their classroom at some point in their career. Therefore, reviews with an aim to translate academic research into school practice are very relevant and timely. Educational research needs to collaborate more closely with disciplines such as psychology and learn from each other and focus more on the needs of pupils with autism and their teachers who should be equal contributors to the development of rigorous, valid and effective interventions. Academics need to engage in real word research by empowering stakeholders to use bottom up methods of conducting research

while paying extra attention to the rigor of the methodology they employ. Drawing general conclusions from such a small number of empirical studies can be precarious, as there is variability in the autism population and the studies might have been conducted in different cultural backgrounds and school systems.

It is very encouraging that an increasing number of studies are being carried out in school settings involving teaching staff in the research process. This knowledge can form the basis for creating an inclusive environment and avoiding the application of clinical trials at school. In order to achieve this, teaching staff should be trained in being reflective so that they can implement successful strategies without the implementation of clinical interventions in schools. Anyway, RCTs, which are often perceived as the gold standards of research designs, might have limited applications for populations with such uneven profiles such as the autism population. This view is in accordance with Porter's (2015) argument that teachers should be trained to become discerning readers of research and implement research informed practice at schools. Future research can focus on enlightening other aspects of play that children with autism can be engaged and guided such as having fun, pleasure, inter-subjectivity, creativity, diversity and thematic coherence in play. Even more autism research needs to be influenced by theoretical approaches of mediated learning and bridge the gap between clinical research interventions and school-based interventions as well as the gap between school-based and home-based interventions.

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* To signify papers which were included in the review.