Occupational therapy and play

Practice guideline supplement

Appendix two: Evidence tables

Royal College of
Occupational
Therapists

This supplement provides details of the evidence used to formulate the recommendations in the guideline *Occupational therapy and play* (RCOT 2023). Each piece of evidence is summarised in a table, including methodological details, study findings and limitations. A full reference for each follows the tables. More information on the criteria and methodology of the grading of the evidence can be found in the full practice guideline, Table 10.4.

The full practice guideline is available on the Royal College of Occupational Therapists' website: https://www.rcot.co.uk/practice-resources/rcot-practice-guidelines

Author: Royal College of Occupational Therapists

Editor: Angie Thompson

Guideline Development Group: Tahnee Cohn, Carolyn Dunford, Naomi Graham, Sophie Hammond, Cath Hubbuck, Claire Lancaster, Ruth Parker, Tanya Rihtman, Elena Roosinovich, Katy Strudwick, Lorna Wales

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Other enquiries about this document should be addressed to the Royal College of Occupational Therapists Research and Innovation team at the above address.

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Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Arbesman et al (2013)	Systematic review Aim: to understand the effectiveness of activity-based interventions for mental health promotion, prevention and intervention with children and young people. Inclusion: article published in either a peer-reviewed journal or peer reviewed evidence-based review since 1980 in English; age range of study participants: 3–21 years; intervention described embedded in activities and within domain of occupational therapy; outcomes measured included social or peer interactions or compliance with adult directives or social rules or norms; article provided Level I, II or III evidence. Exclusion: presentation and conference proceedings, non-peer-reviewed literature, dissertations and theses.	• Reviewers, American Occupational Therapy Association (AOTA) staff, and the AOTA project methodology consultant first identified search terms, and the advisory group reviewed them. • Studies were grouped according to strength using a standardised system. • Search terms included: activities, activities of daily living, bullying, friendship, health, leisure, out of school activities, play, promotion/ wellness, recreation, resiliency, school mental health, stress and transition.	• The review used a standardised hierarchy of research to assess the quality and level of research. • Categorised Level I (systematic review) through to Level V (case reports). • Strength of evidence is classified using guidelines of the US Preventative Services Task Force. • The Public Health model of mental health is used to identify themes.	• Strong evidence indicates that children with intellectual impairments, developmental delays and learning disabilities benefit from social skills programming and play, leisure and recreational activities. • 77 (62%) classified as Level I evidence. • 27 (22%) were classified as Level II studies. • 20 (16%) were classified as Level III studies.	Grade A – High. Comments: • Systematic review with rigorous strategy, explanations and discussion. • The review covers a wide population and a broad discussion of occupational therapy practice that can be applied locally.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Axford et al (2018)	Non-randomised controlled trial. Aim: to examine the effectiveness of tablet applications that required specific motor skills designed to improve fine motor skills. 2 pre-primary classes of children selected as convenience sample. 53 children (29 intervention, 25 control). Male:female ratio: 1:1. Age range: 5–6 years. Australia.	• Identical programmes were run in the experimental and the control group, except for the tablet activity replacing 30 minutes of tabletop activities for the experimental class. • Activities included threading, cutting, jigsaw and form-board puzzles and building with blocks and formed a normal part of the school programme. • During the 30 minutes of tablet time, the teacher selected 3 apps from each curriculum area with a range of motor skills.	• Children completed the Beery Developmental Test of Visual Motor Integration (VMI) and observation checklist, the Shore Handwriting Screen, and self-care items from the Hawaii Early Learning Profile. • These were implemented by 6 final year occupational therapy students, trained in the use of VMI and supervised by 2 occupational therapists.	• The experimental group made a statistically and clinically significant improvement on the VMI motor coordination standard scores with a moderate clinical effect size ($p<0.001$). • Children's occupational performance in daily tasks also improved.	Grade C – Low. Comments: • Study provides a structure that could be applied to a similar population but educational approaches vary and also the age that children start school varies globally. • All children identified as within typically developing range – may have greater impact on those identified as developmentally delayed in the areas assessed.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Bonney et al (2017)	Randomised controlled trial. Aim: a stratified randomised pre-post single blinded design was used to evaluate practice effects on transfer of motor skills using the Nintendo Wii program in children with and without developmental coordination disorder (DCD). Recruitment: via 1 school. Inclusion: four DSM-5 criteria were used to identify children with DCD and typically developing (TD) children: (1) no evidence of functional motor problems as observed by their teacher or parent, (2) a score above the 15th percentile on the Movement Assessment Battery for Children-2 (MABC-2), (3) no diagnosis of a significant medical condition as reported by a parent and (4) absence of intellectual or cognitive impairment as confirmed by their parent and teacher. 111 children with DCD and their typically developing peers, aged 6–10 years. South Africa.	• Children were randomly assigned to either variable (n=56) or repetitive practice (n=55). • Participants in the repetitive practice played the same exergame (ski slalom) twice weekly for 20 minutes, over a period of 5 weeks, while those in the variable group played 10 different games. • Motor skills such as balance tasks (hopping), running and agility tasks, ball skills and functional activities were evaluated before and after 5 weeks of training.	• Motor coordination was assessed via the Movement Assessment Battery for Children-2 (MABC-2.) • Running, agility and balance measures via Bruininks Oseretsky Test of motor proficiency 2 (BOT2). • Functional strength tasks from the Functional Strength Measure (FSM). • Sprinting tests to assess how quickly children could run and turn over short distances.	• ANOVA repeated measures indicated that both DCD and TD children demonstrated transfer effects to real life skills with identical and non-identical elements at exactly the same rate, irrespective of the type of practice they were assigned to. • Concludes that motor skills acquired in the VR environment transfers to real world contexts in similar proportions for both TD and DCD children. • The type of practice adopted does not seem to influence children's ability to transfer skills acquired in an exergame to life situations, but the number of identical elements does.	Grade A – High. Comments: • Limitations include the repetitive game presenting different challenges each time played, and the study having only a 5+-week duration.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Cahill et al (2020)	Systematic review. Aim: to identify evidence for occupational therapy interventions for children and young people with and at risk for mental health concerns. Inclusion: articles describing interventions that were activity or occupation based, published in English-language peer-reviewed journals between January 2010 and March 2017 identified through searches of MEDLINE, psycINFO, CINAHL, ERIC, OTseeker and Cochrane database. Exclusion: conference proceedings, non-peer-reviewed publications, dissertations, theses and presentations.	• The methodology in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses was used to complete the review. • Of 5,310 articles screened by title and abstract, 357 were retrieved for full-text review and 62 met inclusion criteria.	• Strength of studies analysed Level I – Level III. • Categorised into type of activity/intervention for mental health/positive behaviour/social participation and each article strength.	• Of the 62 studies included in the review, 20 (32%) were Level I studies, 22 (36%) were Level II studies and 20 (32%) were Level III studies. • Articles were categorised into the following types: outdoor camps, video and computer games, productive occupations and life skills, meditation, animal-assisted interventions, creative arts, play, sports and yoga. • Moderate to strong evidence supports the use of yoga and sports. • Moderate-strength evidence supports the use of play and creative arts. • Evidence for the use of animal-assisted interventions, meditation, video and computer games, and productive occupations was of low strength.	Grade A – High. Comments: • Majority of articles reviewed were not play-related. • The authors did not focus on the moderate evidence found that play improves social participation for children and young people with or at risk for mental health concerns.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Coussens et al (2020)	Systematic scoping review. Aim: to synthesise peer-reviewed literature about barriers and facilitators of participation according to the perspective of parents of children under 6 years old with Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD) and/or Developmental Coordination Disorder (DCD). Inclusion: qualitative, quantitative and mixed methods studies focusing on parents' perspective of participation in young children (0–6 years) with ADHD, DCD and/or ASD. Exclusion: Non-empirical articles. 13 articles included.	• Not applicable	• Elements contributing to perceived barriers and facilitators were identified and organised according to the International Classification of Functioning, Child–Youth Framework (ICF). • Themes from different studies are combined under ICF theme headings.	• 4 studies were high-quality, nine moderate studies. • 4 qualitative, 4 mixed-methods, 3 reviews (1 systematic, 1 qualitative and 1 with mixed designs). • 5 focused on ASD, 1 on ADHD and ASD and 1 on DCD • 6 on children in early intervention or who were at risk of or had been diagnosed with DD. • Leisure and play were among the top 3 parent goals. • Parents reported that limitations in feeding or toileting hindered participation in leisure and play. • Parents experienced more efficacy and satisfaction about their child's participation when interventions were embedded in family routines and settings. • Parents reported parent training was important in their perception of children's gains. Parents highly valued training that facilitated their skills in improving communication, play and behaviour outcome. • Parents valued social communication through play.	Grade B – Moderate. Downgraded owing to: • Some methodological limitations. • Databases used were limited to MEDLINE and Web of Science, which could have limited papers related to therapy and education • No meta-aggregation of data.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Crawford et al (2014)	Integrative review. Aim: to examine strategies that facilitate inclusion in play among children with physical disabilities in childcare centres. 9 databases searched. Inclusion: empirical studies published in English in a peer-reviewed journal between 1990 and 2012, with either qualitative or quantitative methodology, that investigated the effects of inclusion strategies for play in childcare settings, among children aged 2–5 with physical disabilities. Exclusion: studies on play in a therapy context. 9 studies. United States of America.	• Not applicable.	• Not applicable.	• The role of the adult facilitator: studies showed the importance of the adult facilitator. Subthemes included the need to have individualised approaches; self-awareness of the facilitator's presence, since children with disabilities tended to play with adults over peers; prompting and praise are recommended when playing in the classroom; and promoting play equity and fairness among the children. • The importance of environmental factors. Subthemes included the physical setting influencing play choices; types of toys available and presented to children influenced play; and the type of play activities available.	Grade B – Moderate. Downgraded owing to: • Not as rigorous as a systematic review. Comments: • Limitations include 'play' being poorly defined, limiting the ability to compare studies and draw conclusions and that the majority of included studies did not achieve a high evidence rating.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Engelen et al (2013)	Randomised controlled trial. Aim: to explore the effects of a school-based intervention for increasing physical activity. Recruitment: children aged 5–7 years old randomly selected from 12 Australian primary schools. 226 children. Australia.	• Schools were randomly allocated to the intervention or control conditions. • The 13-week intervention comprised: (1) altering the school playground by introducing loose materials and (2) a teacher–parent intervention exploring perceptions of risk associated with children's free play. • Testing took place in Sydney, 2009–2010.	• The primary outcomes were total accelerometer counts and moderate–vigorous physical activity (MVPA) during break times.	• 221 participants were tested at baseline. • Mixed-effect multilevel regression revealed a small but significant increase from the intervention on total counts (9,400 counts, 95% CI 3.5–15.2, p=0.002) and minutes of MVPA (1.8 min, 95% CI 0.5–3.1, p<0.006); and a decrease in sedentary activity (2.1 min, 95% CI 0.5–3.8, p<0.01) during break times. • Retested children in 1 intervention school after 2 years; they maintained the gains.	Grade A – High. Comments: • Limitations include benefits may not be generalisable to rural schools or schools in other countries with different climates and cultures.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Graham et al (2015)	Qualitative study. Aim: to explore parents' understanding how children with cerebral palsy (CP) play and how play is used as a therapeutic tool within therapy and home programmes. Recruitment: by referral from the Bobath Centre, a British charity providing occupational, physical and speech therapy for children with CP. Inclusion: parents of children with severe CP or Gross Motor Function Classification System Level 4 or 5 as assessed by Bobath Centre therapist, between 3 months and 9 years of age, living in Buckinghamshire, Hampshire, Hertfordshire, Greater London, Oxfordshire, Surrey or Sussex. Exclusion: parents of children without a diagnosis of CP and parents who were unable to speak English fluently. Convenience sample of seven parents. United Kingdom.	• In-depth semi-structured interviews in the participants' homes, using a previously piloted topic guide. • Parents were asked to recall and discuss a recent play experience, other typical play, unexpected play experiences, therapist play, home programmes and play in their child's home programme.	• Contextual information sheet to collect brief demographic details about the parent and child with CP, the level of functioning of the child and the number of other children in the family.	• Analysis of the data led to the development of 4 themes: typical play, burden of play, expanding the concept of play and therapy and play. • Authors identified implications for occupational therapists: affirm elements of children's play that are similar to play in typically developing children; recognise the burden of play on parents and teach methods of independent play to help relieve burden; explain how play can be redefined and how children can experience play vicariously; explain the need for play incorporating therapy and also 'play for plays, sake', in which therapeutic goals are ignored.	Grade C – Low. Comments: • This is a small-scale, in-depth study with only 7 participants.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Guerette et al (2013)	Cohort study. Aim: to understand the impact of early powered mobility on children's social skills, verbal and mobility interactions and interaction with toys/objects during play and developmental level of play. Recruitment via outpatient rehabilitation centres. Inclusion: children with cerebral palsy (CP) between ages of 18 months and 6 years, children with orthopaedic disabilities causing severe limitation in locomotion. Exclusion: children with profound cognitive delays. 23 children. Mean age: 47 months (children with CP), 30.1 months (children with other orthopaedic disabilities). United States of America.	• Baseline data collected at the time the clinician recommended a wheelchair (pre-test 1). • Second set of parental assessments and observational data collected immediately prior to wheelchair delivery (pre-test 2). • 3 to 7 months after the child had received and had begun using the wheelchair, a final post-test set of parental assessments and observational data was collected.	• Social skills measured using the Adaptive Social Behaviour Inventory (ASBI) for children ages 18 months–3.5 years, and the Preschool and Kindergarten Behaviour Scales for children 3–6 years. • Parental perceptions of their child's social skills evaluated using Survey of Technology Use (STU). • Frequency of mobility play activities and interactions with toys. • Quality of play activities and verbal interactions.	• ASBI data showed a significant difference in means between pre- and post-tests for the prosocial component, (p=0.02) with positive social skills increasing significantly during the post-test phase. • No significant differences were found between phases in negative social skills, which were fairly low throughout. • STU showed a significant difference between means in the pre and post-testing in the child's ability to remain engaged in a task (p=0.03). • During indoor free play, the average developmental level of play increased significantly from pre-test 1 to pre-test 2, then remained elevated during the post-test (p=0.04). • For outdoor free play, there was a significant difference in the quality of interactive play from pre to post-test (p=0.04). • No change in the mean quality of verbal interactions across phases during indoor or outdoor free play (p=0.26, p=0.89, respectively).	Grade C – Low. Comments: • Study shows the importance of assessment for possible provision of powered wheelchair. • Can be applied to local population. • Positive ratings of social impact consistent with other studies.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Hammond et al (2014)	Pilot randomised controlled trial. Aim: to evaluate whether short, regular school-based sessions of movement using a commercially available home video game console (Nintendo's Wii Fit) would lead to benefits in both motor and psychological domains in children with Developmental Co-ordination Disorder (DCD). Recruitment: via 2 primary schools who were already taking part in the 'Jump Ahead' programme for children with movement difficulties. Inclusion: children judged to be at risk of functional movement problems, with normal IQ (based on school assessments), and no evidence of neurological disorders. 18 participants (10 intervention, 8 comparison). United Kingdom.	• A crossover intervention study with 2 phases, each lasting 4 weeks with 2.5 months in between each phase. • Children randomly assigned to intervention or comparison. • Intervention group spent 10 minutes, 3 times a week for 1 month using Wii Fit during the lunch break, while the comparison group took part in their regular Jump Ahead programme.	• Children's motor skills were assessed via the Bruininks-Oseretsky Test 2nd version (BOT-2). • The Co-ordination Skills Questionnaire measured the child's self-perceived ability and satisfaction with motor tasks. • The Strengths and Difficulties Questionnaire is a parental assessment of social behaviour and psychopathy. • All measures were taken at baseline, week 4 (end of phase 1) and week 18 (end of phase 2).	• Significant gains were seen in motor proficiency, the child's perception of their motor ability and reported emotional well-being for many children. • Both groups showed improved BOT-2 total scores following the Wii Fit intervention period. • A mixed ANOVA comparing two intervention groups over time identified no significant main effects of either group ($p=0.987$) or time ($p=0.082$). • The group × time interaction was significant ($p<0.02$).	Grade A – High. Comments: • Limitations include the study being a small pilot, the lack of blinding of the researchers and significant time lapse between the two phases.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Jasem et al (2020)	Scoping review, thematic analysis. Aim: to conduct a scoping review of studies that examined play of children with life-threatening conditions (LTC) or life-limiting conditions (LLC) to explore their play characteristics and possible factors influencing their participation in play. Inclusion: documents published between 1990 and mid-October 2017; characteristics of children's play; literature published in Arabic and English; children, play and LTC/LLC used as search terms. Exclusion: non-research articles, studies examining the effectiveness of play. 13 studies.	• Identified articles were critically appraised with the Critical Appraisal Skills Programme and the Joanna Briggs Institute Critical Appraisal Tools.	• Emergence of themes • Quality of research papers.	• The findings indicate that children's play is influenced by their health conditions and play opportunities as well as by the limited availability of appropriate play equipment and spaces allowing play and social interaction. • 2 papers explored children's perspectives on influence of play in the care process during hospitalisation. • 1 investigated impact of health conditions on impact of play. • 6 explored children's experiences receiving care and addressed play to a lesser extent. • Findings classified into: continuity of play, influence of influence of health on play and play opportunities.	Grade B – Moderate. Comments: • Limitations included not a systematic review, only looked at English and Arabic articles, and researcher confirmation bias.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Jasem and Delport (2019)	Qualitative study. Aim: to explore maternal perspectives on play with a focus on preferred type of play, impact of play, impact of play on behaviour and strategies to regulate symptoms and play. Recruitment: purposive sampling from Developmental Paediatric Unit in Kuwait. Inclusion: mothers at least 18 years old, with child 5–10 years old with a professional diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) by paediatrician using DSM-5 criteria. 8 mothers of children with ADHD aged 5–10 years. Kuwait.	• Diaries and interviews used to collect data during summer holiday to limit influence of school day. • Kept 1-week diary of children's daily activities, capturing events and experiences in natural and spontaneous contexts.	• Children's play preferences from mothers of children with ADHD.	• 4 themes emerged: (1) play characteristics for children with ADHD, (2) play preferences, (3) play settings and their impact on ADHD symptoms and (4) mothers' values, understanding and influence on play. • Children were found to spend most of their playtime in indoor settings, largely playing video games. The mothers acknowledged the positive influence on their children of outdoor play and the deleterious effect of video games. However, they undervalued the contribution of play to their children's development.	Grade B – Moderate. Upgraded because: • Has value as a credible source of evidence. Comments: • Limitations include no justification of sample size and short time frame. • There's little research into dynamic between parental play perceptions and child's play participation, particularly with ADHD. • Results may be specific to Kuwaiti mothers' and children's experiences. • Possible bias/influence as primary researcher worked in same clinical context, though unclear if from the same client group. Second researcher deliberately not from same clinical context to reduce bias.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Karamali Esmaili et al (2019)	Randomised controlled trial. Aim: to use the Model of Human Occupation to investigate the effect of peer play activities on occupational values and competence as well as executive functioning skills (EF) in children with specific learning difficulty (SLD). Recruitment: via 4 SLD educational centres through convenience sampling. Inclusion: ages 7–11 years; diagnosis of SLD based the *Diagnostic and statistical manual of mental disorders* 5th ed criteria; parents' mental health and ability to comprehend the questionnaires. Exclusion: comorbid psychiatric disorders, except for attention deficit hyperactivity disorder. 49 children with SLD Intervention: 25 Control: 24 Iran.	• Conducted in groups of 3–5 children. • 2 × 3-hour sessions per week for 9 weeks. • Control group received no treatment during this intervention phase. This group did receive 5 sessions of peer play activities after the post-intervention assessment. • The intervention included practice play, symbolic play and games with rules. It contained cooperative (shared materials for individual projects) and collaborative (adherence to responsibilities and rules for joint projects) play.	• The Behaviour Rating Inventory of Executive Function (BRIEF – Parent version) used to investigate the EF components in the context of the natural environment of children ages 5–18. It contains 2 indices: the Behaviour Regulation Index (BRI) and the Metacognitive Index (MCI). • Child Occupational Self-Assessment (COSA) measures the child's self-assessment of participation and competence in everyday occupations. • Both were conducted before and after the intervention.	• Data analysis showed that the effects of the intervention on EF skills were medium to large – 0.12 for the BRI and 0.20 for the MCI based on Cohen's criteria. • The mean BRIEF indices significantly improved after intervention ($p<0.05$). • There was a slight change in the mean scores between the pre and post-intervention measurements in the control group (BRI=0.16; MCI=1.04), and a greater change in the intervention group (BRI=8.52; MCI=15.32). • The occupational values and competence did not change according to the COSA between the two groups ($p>0.05$).	Grade A – High. Comments: • The study has some application to intervention for executive function for children with learning disabilities. There are no significant limitations which appear to have impacted the relevance of the results. • The intervention was tested against no intervention rather than 'treatment as usual', so further investigation of what is normally offered and the effectiveness of that is needed.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Kent et al (2021)	Randomised controlled trial. Aim: to examine the effectiveness of The Ultimate Guide to Play, Language and Friendship intervention for improving the social play skills of children with Autism Spectrum Disorder (ASD) in peer-to-peer interactions. Recruitment: via convenience sampling. Inclusion: children 6–12 years old with a diagnosis of ASD by a paediatrician or psychiatrist, using recognised diagnostic procedures, with any common co-morbid conditions. Exclusion: diagnosed with other major developmental disorders or did not attend mainstream school. 68 dyads. Mean age (intervention): 8.68. Mean age (control): 8.44. Gender (male): intervention = 93.75%, control = 81.81%. Australia.	• Dyads randomised to either a 10-week treatment first or waitlist control group. • Weekly 1-hour clinic sessions over 10 weeks, with pre-clinic videos created before each session and a home play session facilitated by the parents of the child with ASD between clinic sessions. • At the clinic phase the therapist conducted video modelling with dyad first, then play session, with therapist joining dyad for peer modelling. • Therapist and parent observe play and discuss observation and home play sessions.	• Test of Playfulness (ToP) was the primary outcome measure used to examine children's play skills in peer interactions. • Child, Parent and Teacher Report measures – the Piers-Harris 2 and the Home and Community Social Behaviour Scales for social competence and antisocial behaviour and the Parenting Relationship Questionnaire used as secondary measures. • All 3 administered at pre-control period assessment time, pre-intervention, post-intervention and 3-months follow-up.	• Intervention demonstrated a moderate positive effect on the play. • The overall change in play performance in the intervention-first group was significantly greater than the change in the wait-list control group (t(63)=2.471, p=0.016, d=0.6). • Repeated measures ANOVA showed that there was a significant increase in ToP scores over time (p<0.0001). The treatment effect of ToP data for pre to post-intervention once all participants were included in the analysis was moderate. • There were significant differences in pre-intervention ToP scores between sibling and non-sibling peer groups (p=0.018) and between male and female participants (p=0.029).	Grade A – High. Comments: • Limitations included not all teachers and parents returned completed secondary outcome measures, thus reducing statistical power of secondary measures, which in turn could have resulted in some moderators not being identified. • No confidence intervals reported but t-tests used.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Kolehmainen et al (2015)	Cohort study – mixed methods intervention development study. Aim: to identify potentially modifiable, specific factors – across body function and structure, activity, environmental, and personal factors – related to participation in physical play/ leisure (PPP) in children with motor impairments and modifiable by therapists. Recruitment: via 6 children's physical therapy or occupational therapy services (or both) in the NHS in England and Scotland. 195 children 6–8 years old with motor impairments, mobilising independently with or without equipment and seen by physical therapists or occupational therapists. United Kingdom.	• Therapists recruited the children; administered the Children's Assessment of Participation & Enjoyment (CAPE) and collected the problem list data; handed out parent questionnaires and collected them when complete; placed each child's data, including the parent questionnaire, in a sealed envelope; and obtained consent for passing the data to the research team.	• CAPE. • Problem list data. • Parent questionnaires.	• Children's PPP was mainly 'recreational' (for example, pretend play, playing with pets) rather than 'active physical' (for example, riding a bike/scooter). • Parents (n=152) reported positive beliefs about children's PPP but various levels of family PPP. • Therapists reported 23 unique impairments (for example, muscle tone), 16 activity limitations (for example, walking), and 3 personal factors (for example, child's PPP confidence). • Children interviewed (n=17) reported a strong preference for active play but indicated that adults regulated their PPP.	Grade B – Moderate. Upgraded owing to: • Robust study, large sample size with good analysis. Comments: • Limitations include degree of self-selection bias possible and caution should be taken in generalising the results to children whose parents have less positive views about PPP.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Kuhaneck et al (2020)	Systematic review. Aim: to examine the efficacy of strategies used in occupational therapy to benefit play in children with autism spectrum disorder (ASD). Inclusion: 3–18 years old with ASD; intervention strategies included those considered hallmarks of occupational therapy such as modifying or altering activities, materials, or contexts or facilitation of engagement with prompting, cueing, directing or modelling; strategies were related to therapeutic use of self, such as modifying adult interaction style. Exclusion: studies did not have specific outcome measure of engagement in play with statistical measure of change post intervention; outcomes were merely a component of play or a specific skill, ability, or trait (such as motor skills). 20 studies.	• Interventions included parent education, modified play materials or environments, imitation of the child and modelling by an adult, a peer or video. • 6 interventions were adult-structured and 11 were child-directed, and some were both. • 9 interventions were individual child studies and nine were small groups or dyads. • Settings included schools, research locations, home or summer camp. • Duration varied from 3 minutes to 4.5 hours per day for 6 months. • Most frequent professional was a psychologist. Occupational therapists were interventionists/co-interventionists in only 3 studies.	• Specific assessment tools included the Penn Interactive Peer Play Scale (2 studies), the Child-Initiated Pretend Play Assessment (2 studies), the Play Observation Scale (1 study), the Structured Play Assessment (3 studies), the Test of Playfulness (1 study) and the Play History Interview (1 study). • Most included researcher-created play coding schemes to rate behaviours from videotaped or observed play sessions. • The types of coding that occurred included ratings of play novelty, mother–child interaction during play, developmental play level, affect, play complexity, involvement, fun, frequency and duration of types of play and symbolic action.	• Interventions targeting play were effective in benefiting play. • Imitating the child (strong–moderate evidence) was the most consistent finding. • Imitation more effective than modelling and contingent play for benefiting play creativity and duration. • Modelling (moderate–strong evidence) benefited specific aspects of play, such as functional play skills and ability to engage in play dialogue. • Modification of environment (moderate evidence) influences play performances, but modifications varied between studies making it difficult to determine which modification was best. • Insufficient evidence or mixed evidence for rest of strategies.	Grade A – High. Comments: • Minimal reporting of racial and socioeconomic background of participants. • Children with ASD were grouped together, often with limited information about functional levels or language abilities. • Risk of bias for many studies was high – the limitations of the included studies greatly limit ability to make definitive conclusions. • Not clear what quantitative synthesis method was used. • No follow up from reference lists reported. • No personal contact with expert reported. • No reference to unpublished studies reported.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Mobbs et al (2021)	Systematic review. Aim: to identify and examine the psychometric properties of participation measures for infants and toddlers aged birth to 23 months according to family of Participation-Related Constructs (fPRC). Inclusion: measures available in English that quantify at least one participation concept of 'attendance' and/or 'involvement' according to the fPRC, with psychometric data for infants or toddlers aged from birth to 23 months published in a full text, peer reviewed journal. 4 measures met the inclusion criteria: Child Engagement in Daily Life (CEDL) measure, Daily Activities of Infants Scale, Test of Playfulness, and Young Children's Participation and Environment Measure.	• Online biomedical databases PubMed, Cochrane, CINAHL and Embase were searched from 2001 (coinciding with the publication of the International Classification of Functioning, Child–Youth Framework) to August 2016 and repeated in November 2019 to ensure the most up-to-date articles were included. • Secondary searches of titles and authors and reference lists of included papers and other systematic reviews on participation measures were conducted. • 2 authors independently screened papers at the title and abstract phase for inclusion for full text review using Covidence systematic review software.	• COnsensus-based Standards for selection of health Measurement. INstruments (COSMIN) checklist was used to rate the methodological quality of studies across nine measurement properties.	• All 4 measures measured 'attendance' and 3 also measured 'involvement'. • Measures showed unknown to moderate validity and unknown to moderate reliability, with the CEDL reporting the strongest psychometric properties. • There are few measures that evaluate infant and toddler participation. • Further research is needed to develop psychometrically sound participation measures that evaluate 'attendance' and 'involvement' for this population.	Grade B – Moderate. Downgraded owing to: • Only 4 studies of variable quality met the inclusion criteria, age groups not able to be broken down in some papers. Cost effectiveness not considered.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Mohammadi et al (2021)	Randomised controlled trial. Aim: to investigate the effect of play-based occupational therapy on symptoms and participation in daily life activities in hospitalised children with cancer undergoing chemotherapy. Recruitment: via one children's hospital. Inclusion: children aged 7–12 years receiving a type of childhood cancer diagnosis, a history of chemotherapy in hospital, re-admission to the oncology department for chemotherapy, obtaining a minimum score of 4 in pain and fatigue, and 3 in anxiety for children; parents have sufficient reading and writing ability and fluent in Persian. Exclusion: any changes in the chemotherapy protocol and unwillingness to cooperate with the study for more than 2 treatment sessions. 25 children with cancer undergoing chemotherapy. Iran.	• The intervention group received 8 1-hour play-based occupational therapy sessions (45 minutes of play-based occupational therapy and 15 minutes of free play). • Control group received traditional occupational therapy services.	• Participation in daily life activities, therapy-related symptoms, pain, anxiety, and fatigue were evaluated. • The therapy-related symptom checklist – includes 30 items categorised into 7 groups of symptoms, including nutritional, psychosocial, oropharyngeal, toxicity of bone marrow, skin, nervous system and respiratory system symptoms. • The Children Participation Assessment Scale – a 71-item questionnaire used to assess the participation of children in 8 areas of basic and instrumental daily life activities, play, leisure, social participation, education, work and sleep/rest.	• Total mean scores of participation in daily life activities in the intervention group in the diversity of activities, intensity of participation, with whom done, enjoyment and parents' satisfaction were significantly higher than in the control group. • Symptoms decreased in both groups; however, this trend had a significant difference in the intervention group for the therapy-related symptom checklist, pain, anxiety and fatigue scores. • Authors conclude a 2-week course of in-patient play-based occupational therapy is an effective approach in the reduction of cancer symptoms, therapy-related symptoms and the participation facilitation of children with cancer in daily life activities.	Grade A – High. Comments: • Limitations include small study size and context of children with cancer undergoing chemotherapy.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Moore and Lynch (2015)	Scoping review. Aim: to explore the evidence regarding accessibility and usability of playgrounds for children of all abilities to identify factors that enable or constrain social inclusion in community playgrounds. Inclusion: English language. 14 studies. Sweden, Canada, the USA, England, Portugal, Turkey and Australia.	• An electronic search of CINAHL, Ebsco, PubMed and the Cochrane Library was performed to examine multiple databases using the PICO framework. • 14 studies were included: 6 quantitative studies, 5 qualitative studies, and 3 literature reviews. • Studies were analysed and coded on a paragraph-by-paragraph basis to identify themes and categories.	• Summarising of evidence by participants, political environment and social environment.	• Findings focused on children with physical disabilities and mostly included the adult's perspective. • The review found few playgrounds were accessible, usable and inclusive for many children with disabilities, and some did not meet the needs of typically developing children. • 11 studies explored the effects of the physical environment on children's access to and participation in the playground environment. • 7 studies explored the design concepts that can facilitate inclusion/exclusion of children in playground environments. • 9 studies looked at the effects of the political environment (for example, policy and standards documents) on children's access to and participation in the playground environment. • 5 studies explored the principle of equity on the playground. • 2 studies evaluated the usability of playground environments.	Grade B – Moderate. Downgraded owing to: • This was a scoping review, which is not as rigorous as a systematic review. Comments: • More research is needed on the accessibility and usability of playgrounds for children with intellectual disabilities and that seeks the perspective of children.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Potasz et al (2013)	Randomised controlled trial. Aim: to see if unstructured play can reduce stress for children during hospitalisation. Stratified sampling according to age range. Inclusion: children aged 4–14 years hospitalised at a public paediatric hospital for respiratory diseases; minimum hospital stay of 6 days. Exclusion: children with neurological or psychiatric disorders, locomotion restrictions, and other common childhood diseases; children who had taken any medication previous to or during hospitalisation that could influence cortisol levels (LC). 53 patients. Male:female: 27:26. Brazil.	• Children divided into: (1) the playing group (PG), formed by children admitted to wards participating in play activities during hospitalisation (27 children). (2) non-playing group (NPG) consisting of children admitted to a ward not engaging with play activities (26 children). • These were randomly allocated by physicians not aware of the study. • Rotation between wards allocated by a lottery. • Toy library formed using a variety of toys stored in room where children were invited to play twice a day, and toys could be taken back to beds. • Toys included 'home' toys, 'beauty' toys, games such as puzzles and competitive games, dolls and 'doll-like' toys. • Trained professionals, 10 entertainers, and an occupational therapist from the neuro psychiatry staff monitored play activities.	• LC in the urine sampled for 24 hours. Variations in cortisol in relation to baseline in both groups and compared mean values pre and post-intervention within the groups.	• No statistically significant differences in baseline LC considering the intervention play, gender, age range, social classification, CDI scores and previous experience of hospitalisation. • The number of children who showed a reduction in LC was larger in the PG than the NPG. At the end of the intervention period, 20 children in the PG showed a reduction in LC of 20% over baseline values (AR=71.4%), while in the NPG 12 children showed a reduction in LC (AR=41.4%). The AR reduction was 30% (RR=1.73; CI 95% 1.03 to 12.53; NNT=3.32 and p=0.04).	Grade A – High. Comments: • Demonstrates the value of play to reduce stress for some children during admission. • Resources likely to be available in a standard children's hospital – may be restricted in a general hospital. • May be more suited to specialised hospital units as focuses on unstructured play.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Román-Oyola et al (2018)	Semi-structured interviews guided by a phenomenological design. Aim: to explore the perspectives of parents with children with autism spectrum disorder (ASD) regarding play experiences and self-efficacy during play encounters. Recruitment: via direct contact or referral from occupational therapists of children with ASD. Inclusion: availability of both parents for participation, parents ≥ 21 years old, and children 3–7 years of age with a diagnosis of ASD. 4 mothers. 4 fathers. Puerto Rico, USA.	• Not applicable.	• None identified.	• General context of the play experience: all expressed positive emotions related to play experiences with their children and commented on the importance of it. They also described the difficulty of fitting play into busy lives. • Playfulness in the context of parent–child interactions: play was often shaped by the child's preferences, making them more effective and enjoyable. When children were not in control of play, it could lead to tantrums or trying to change the activity. Parents also framed activities to make them more attractive. • Self-efficacy during play: motivations versus benefits: perceived ability to interact with their children made parents feel competent and playing allowed parents to relate to their children and strengthen bonds. While fathers were more likely to say they played with their children for emotional reasons (to see them laugh, etc), they perceived the benefits as development. Mothers said they played to develop their child's skills but perceived the benefits to be emotional.	Grade C – Low. Comments: • Limitations include the small number of participants and relative diversity of participants means data saturation was not reached, and that results might not be generalisable.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Rousseau-Harrison and Rochette (2013)	Systematic review. Aim: to explore the impacts of wheelchair (WC) acquisition on children's social participation, personal factors and social environment. Inclusion: population studied was children from birth to age 12, published in French or English and concern the impacts of a WC on children, their social participation or social environment, published in a peer-reviewed journal, at least half of the sample had to consist of children up to age 12, all study design types. Exclusion: studies that looked only at biomechanical aspects (positioning) or WC components (for example, joystick controls). 9 studies. Canada, United States, Sweden, Guatemala and Italy.	• A literature search was done in MEDLINE for the years 1996 to 2011 (June). • Acquisition of a powered WC.	• Parents' perceptions of their stress, negative emotions and family social interactions (PSSC, MATCH, Survey of Technology Use, QUEST). • Caregivers' perceptions of changes following WC acquisition (interviews, observations, photos and review of medical file). • Mothers' perceptions of children's use of powered WC (In-depth interviews). • Skill driving powered WC – development and functioning (BDI, PEDI, interviews). • Perception and experience of children with disabilities who use a mobility aid (PIQ, VIQ, GMFM, COPM, Furumasu's driving test, ICIS, SAQ-self, SAQ-others. • LIFE-H, Locomotion section of WeeFIM PFIM.	• Observed a trend towards improved participation in personal care, mobility, interpersonal relationships, and play. • Data regarding the effect on the development of cognitive functions are contradictory.	Grade A – High. Comments: • Didn't consider all important outcomes – most studies analysed observed perceptions. Cannot infer true impact on children. • 5 out of 9 studies analysed were statistically significant; however, article does not provide further information on the numbers. • The authors propose that the results incentivise therapists to suggest mobility options to children with the appropriate profile.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Salem et al (2012)	Randomised controlled trial. Aim: to determine the feasibility and preliminary effectiveness of a low-cost gaming system for young children with developmental delay. Recruitment: via a segregated or integrated preschool from 2 centres. Inclusion: children 3–5 years; clinical diagnosis of developmental delay; documented physical impairments or motor delay; no musculoskeletal defects that might prevent ability to use the Wii and grasp the Wii Remote™; normal or corrected hearing and vision; no previous experience with the Wii; and ability to understand and follow simple directions and perform requested tasks. Exclusion: Children with known genetic/medical conditions, a diagnosis of autism or attention deficit disorders, orthopaedic surgery in the previous 6 months prior to participation in the study, uncontrolled seizures. 40 children. United States of America.	• Children were randomly assigned to an experimental (Wii) group (n=20) or a control group (n=20). • 2 weekly sessions for 10 weeks using Nintendo Wii Sports™ and Nintendo Wii Fit™, including balance, strength training and aerobics games. • Participants were evaluated 1 week before and 1 week after the programme by a blinded investigator.	• Primary outcomes were gait speed, timed up and go test, single leg stance test, five-times-sit-to-stand test, timed up and down stairs test, 2-minute walk test and grip strength. • The Gross Motor Function Measure was used to assess gross motor skills.	• The 2 groups were homogeneous regarding all parameters at baseline. • The Wii training was feasible and enjoyable for those in the experimental group. • There were no adverse effects or injuries reported over 267 training sessions. • Comparison of groups following the intervention indicated that the experimental group showed significant improvements compared with the control group in single leg stance test (mean difference 1.03 [standard deviation (SD) 1.7], 95% confidence interval (CI)=0.2–1.9; p<0.017), right grip strength [mean difference 1.11 (SD 1.84), 95% CI 0.15–2.06; p<0.024] and left grip strength [mean difference 0.90 (SD 1.67), 95% CI 0.03–1.77; p<0.043]. • Although changes in other outcome measures were not significant between the study groups, there were trends towards greater improvements in the experimental group compared with the control group.	Grade A – High. Comments: • Limitations included the lack of blinding of the supervising therapist, that children's physical activity outside the intervention could not be controlled, a lack of true control group since they received usual care that may have resulted in improvements, a modest sample size, and that the results cannot be generalised to children with severe disabilities.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Schaaf et al (2018)	Systematic review. Aim: to understand the efficacy of Ayres Sensory Integration® (ASI) in occupational therapy to support functioning and participation of people with processing and sensory integration challenges. Inclusion: (1) articles published in the peer-reviewed scientific literature in English between 2007 and May 2015; (2) the intervention approach adhered to the principles of ASI; and (3) participants were children and adolescents assessed to have challenges in processing and integrating sensation. United States of America.	• A total of 5 articles met the inclusion criteria and were included in the final review: 3 Level I studies, 1 Level III study, and 1 Level IV study. • Articles included 3 randomised controlled trials, 1 retroactive analysis, and 1 single-subject ABA design. • All were published from 2007 to 2015. • All studied children with autism.	• Studies measured functioning and participation. • Measurements used included the Goal Attainment Scaling (GAS), the Sensory Processing Measure, the Vineland Adaptive Behaviour Skills 2nd edition, Paediatric Evaluation of Disability Inventory and the Revised Knox Playschool Play Scale.	• The evidence is strong that ASI intervention demonstrates positive outcomes for improving individually generated goals of functioning and participation as measured by GAS for children with autism. • Moderate evidence supported improvements in impairment-level outcomes such as autistic behaviours and skills-based outcomes of reduction in caregiver assistance with self-care activities. • Child outcomes in play, sensory–motor, and language skills, and reduced caregiver assistance with social skills had emerging but insufficient evidence.	Grade A – High. Comments: • Limitations include weaknesses in the methodology of the included studies. More studies need to include intervention fidelity, sensitive outcome measures, adequate power, larger and homogeneous samples.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Sonday and Gretschel (2016)	Case study. Aim: to explore the way powered mobility impacted the exploratory play of two children with significant motor impairments. Recruitment: purposive sampling. Inclusion: child with impaired motor ability. Ability to communicate was considered. 2 children. South Africa.	• Powered wheelchair recently acquired by the child.	• Parent interview with questions drawn from Takata's Play History. • The Kid Play Profile was used to obtain information directly from the child about their interests. • Photovoice, where parents captured images that represented changes to their child's play since the introduction of powered mobility.	• The theme 'Opportunity to play' illustrated how powered mobility gave the child new opportunities to play, including less stationary play and more self-directed play beyond what they had done previously. • The theme 'My child was transformed' illustrated how the child could become more autonomous, and different aspects of their personality were able to come through.	Grade C – Low. Comments: • Limitations include the researchers not discussing their own role in relation to the participants.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Stagnitti et al (2012)	Cohort study. Aim: to investigate the change in the relationship between play, language and social skills of children aged 5–8 years pre and post-participation in the Learn to Play programme. Recruitment: via specialist schools. Inclusion: Children in their first and second year whose parents gave consent. 19 participants in who attended a specialist school, in Victoria, with 10 of the 19 children having a diagnosis of autism. Australia.	• The Learn to Play programme (6 months) – a child led play-based intervention aimed at developing self-initiated pretend play skills in children. • Children participated in the programme during school hours, in small groups of 4–7 children with 2 adults per group.	• Child-Initiated Pretend Play Assessment (ChIPPA) – a standardised and norm-referenced play assessment that measures children's ability to initiate pretend play, as well as their quality of pretend play. • Penn Interactive Peer Play Scale (PIPPS) – a 32 item rating scale of preschool children's interactive peer play competencies. • Preschool Language Scale 4th ed (PLS-4) – a psychometrically viable instrument developed to assess language skills in children from birth to 6 years 11 months old. • Demographic data. • Baseline data collected and follow up data collected after 6 months.	• The ChIPPA raw scores indicate that the group had very low play ability for age. • Age was not significantly related to any of the variables. • Indicators of typical play and the PIPPS Social Disconnection score ($p<0.01$) had a shared variance of 36% at follow up, which was a 36% increase in the shared variance from baseline. • The Learn to Play programme was associated with increases in children's social interaction, decreases in children's social disconnection and increases in language over a 6-month period with a group of children who were developmentally delayed with diagnoses of intellectual disability and autism.	Grade C – Low. Comments: • Limitations include small sample size and no confidence intervals given. • This study was part of a larger study. • The applicability of this study for practice may need to be considered in a UK context and current practice. Its comparison with other models would need to be evaluated along with cost effectiveness and benefits of implementation.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Stanton-Chapman et al (2018)	Cohort study. Aim: to explore similarities and differences in physical activity levels for boys and girls in 7 areas across 2 playgrounds. Recruitment: recently built playgrounds intended to be fully inclusive for all children, including those with disabilities. Inclusion: All children approximately aged 5–12 years using the playground during observations. Participants remained anonymous to project staff throughout the study. United States of America.	• 2 playgrounds in a mid-Atlantic state were purposefully selected based on their playground design and structure. • Playground A had 5 different areas and Playground B had 3 different areas. • Across the 2 playgrounds, data were collected by observational coders, across 416 total 1-minute intervals (morning, afternoon and evening), spanning 13 days (weekend and weekdays) over a 3-month period.	• The System for Observing Play and Leisure Activities in Youth was used to document children’s physical activity types, track children’s locations and code activity type.	• Detailed observations of children’s play equipment and activity choices may provide insight into optimal playground equipment design and layout for play and social interactions between peers. • Fixed contemporary play equipment and open play spaces should be considered when designing new community playgrounds, as they appear to be equally interesting to boys and girls. • Girls’ attire on a community playground and more available play space may contribute to more active play in girls than what was found in studies investigating play patterns on school playgrounds.	Grade C – Low. Comments: • Findings support the influence of physical environment structures on play.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Sterman et al (2019)	Multiple perspective case study. Aim: to understand outdoor play decision making for children with disabilities from the perspectives and interactions of local government and families of primary school-aged children with disabilities. Recruitment: snowball sampling used to recruit via government-funded primary school within the local government area. 5 mothers, 4 local government employees and 2 not-for-profit organisation representatives. Australia.	• Interviews lasted between 30 and 70 minutes. • Interview questions were largely framed in the positive, focusing on what participants were doing to support outdoor play for children with disabilities. • Document reviews and playground observations also carried out after school hours and weekends – these were used to inform interviews.	• What participants were doing to support outdoor play for children with disabilities. • Transcript analysis of interviews thematically and iteratively analysed through coding. • Participant's values around play analysed through matrices to compare decision-making within and between the stakeholders. • Researcher also triangulated factors affecting these values across parent participants, and between parents and local government.	• Local government focused more on physical access than social inclusion. Local government met only minimal requirements and had little engagement with families. This resulted in poor understanding and action around family needs and preferences when designing public outdoor play spaces.	Grade B – Moderate. Upgraded because: • Cross-section of both planners, people who access services and parents interviews, making the information useful and worthy of consideration. Comments: • Cross sample recruited for interview to minimise bias and recruit a number of perspectives. • Detailed analysis of pros and cons to identify potential confounding factors. • Can't tell what changed as a result of gathering survey information. • Study illustrates the importance of co-production in considering and designing outdoor play spaces for children with a disability.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Sterman et al (2016)	Systematic review. Aim: to synthesise results from qualitative studies on decision making processes of caregivers around outdoor play in children with developmental disabilities using ecocultural theory. Inclusion: children with a lifelong developmental disability that might affect their outdoor play such as cerebral palsy or autism spectrum disorder; children in primary/elementary school, aged 6–12 years; active outdoor play; caregiver decision making around outdoor play, written in English, published in peer reviewed journal, original data collection. Australia.	• Themes derived from studies producing qualitative data from focus groups, interview, survey data on physical activity, structured and unstructured outdoor play. • Seven electronic databases were searched: CINHAL, MEDLINE, Web of Science, ERIC, Scopus, PsycINFO and SocINDEX.	• Thematic synthesis of concepts across studies, organised under themes of the ecocultural model: child, caregiver, family, school.	• Caregivers, families, schools and communities consider many factors when deciding about when, where, how and if outdoor play occurs. • Factors comprised: motivation for participation in outdoor play; social and built environments; familial and school considerations including time and finances; caregivers' awareness of opportunities; and child considerations such as their skills, health and interests. • A dynamic interaction exists between and within the ecocultural environment of a child with developmental disabilities to determine decision outcomes in outdoor play.	Grade B – Moderate. Downgraded because: • Review appears to have been conducted well; however, there are noted limitations to quality of 11 studies included. • Generalisability of findings is limited. Comments: • Main themes were pre-decided, meaning other themes could have been overlooked; however, authors did include a fifth category that arose in analysis. • Results are based on qualitative data so narrative and subjective – no intention to create consensus, but bring together breadth of literature under ecocultural categories.

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Wilkes-Gillan et al (2016)	Randomised controlled trial. Aim: to *examine* the effectiveness of a play-based intervention for improving the social play skills of children with attention-deficit hyperactivity disorder (ADHD) in peer-to-peer interactions. Recruitment: via flyers in paediatric services and ADHD parent support groups in Sydney, national online ADHD support groups and a press release through the University of Sydney's website. Inclusion: children 5–11 years old with formal diagnosis of ADHD. Exclusion: major developmental disorders (for children with ADHD or typically developing peers). 31 children with ADHD (15 in intervention group, 14 in control group) and their typically developing peers who were known to the child. Australia.	• The intervention group received a 10-week play-based intervention, while the control group waited 10 weeks before receiving the intervention. • Intervention included: 6 × 1-hour clinic consisting of 20 minute video feedback sessions which included the child, parent and therapist; 25 minute play modelling by the therapist; and 15 minute feedback session with the parent. • Parents were trained to complete home modules, which consisted of reading a manual chapter, watching a DVD with their child and discussing the behaviour of the characters. They also held 4 playdates with the peer, and gave the child feedback before, during and after. • 1 month after intervention, home visit by author to record and code child playing with their peer.	• Test of Playfulness (ToP) to see if the change in the overall play skills in the intervention group increased significantly compared with the control group. • Children's play was assessed at baseline, post-intervention and at 1-month follow-up.	• Data reported on 29 children; 1 dropped out from each group. • Children's play skills in the intervention group changed significantly more than the control group over the 10-week intervention (intervention group change=23.9, range=6.1–48.3; control group change=–1.4, range=–7.5–10.1; p<0.001). • Children's play skills increased significantly from pre to post-intervention (mean pre=46.65 versus mean post=67.79; p<0.001; 95% CI 16.27–26.00), and from pre to 1-month follow up (mean follow up=69.68; p=0.873; 95% CI –2.59–6.38). • All ToP social items improved significantly for both groups from pre to post-intervention and from pre-intervention to 1-month follow-up (p<0.006).	Grade A – Very high. Comments: • Limitations include a relatively small sample size, the lack of data concerning the severity of neuropsychological impairments and presence of ADHD symptomology, and it is impossible to rule out that a parent change in behaviour caused the ToP improvements instead of the intervention (though the authors think this is unlikely).

Source	Design and participants	Intervention	Outcome measures	Results	Quality and comment
Wuang et al (2011)	Randomised controlled trial. Aim: to compare the effect of standard occupational therapy (SOT) and virtual reality using Wii gaming technology (VRWii) on children with Down's Syndrome (DS). Recruitment: via relevant educational and clinical sources – controls recruited via primary schools. Inclusion: children aged 7–12 years and with a diagnosis of DS determined by the board-certified physicians at local designated hospitals. Exclusion: children with co-existing autism, cerebral palsy, blindness, or deafness, or with history of neurological disorders such as traumatic brain injury, muscular dystrophies and epilepsy. 155 children. Taiwan.	• Children (n=105) were randomly assigned to intervention with either SOT or VRWii, while another 50 served as controls. • Each intervention group received a 1-hour treatment session 2 days per week for 24 weeks. • Treatment was conducted on an individual basis, and each child was randomly assigned to 2 therapists who administered either SOT or VRWii techniques according to the child's assigned group. • Children in the intervention groups were tested after the 24 weeks at occupational therapy clinic. • Children in the no-treatment control group were tested in a quiet classroom at the children's respective schools. • Testing session 1–1.5 hours with breaks.	• The Bruininks–Oseretsky Test of Motor Proficiency-Second Edition. • The Developmental Test of Visual Motor Integration. • The Test of Sensory Integration Function.	• At post-intervention, the treatment groups significantly outperformed the control group on all measures. • Participants in the VRWii group had a greater pre- to post-change on motor proficiency, visual-integrative abilities and sensory integrative functioning.	Grade A – High. Comments: • Limitations include lack of confidence intervals.

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