



A review of cognitive impairments in children with intellectual disabilities: Implications for cognitive behaviour therapy

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Objective. Nearly half of children with intellectual disability (ID) have comorbid affective disorders. These problems are chronic if left untreated and can significantly impact upon future vocational, educational, and social opportunities. Despite this, there is a paucity of research into effective treatments for this population. Notably, one of the most supported of psychological therapies, cognitive behaviour therapy (CBT), remains largely uninvestigated in children with ID. The current review considers the neuropsychological profile of children and adolescents with mild to moderate ID, with a view to informing how CBT might best be adapted for children and adolescents with ID.

Method. Narrative review of literature considering the neuropsychological profiles of children and adolescents with ID, with specific focus upon attention, memory, learning, executive functioning, and communication. Studies were identified through SCOPUS, PsycINFO, and PubMed databases, using combinations of the key words 'intellectual disability', 'learning disability', 'neuropsychology', 'attention', 'learning', 'memory', 'executive function', 'language', and 'reading'.

Results. Children with ID have significant deficits in attention, learning, memory, executive functions, and language. These deficits are likely to have a negative impact upon engagement in CBT. Suggestions for adapting therapy to accommodate these wide ranging deficits are proposed.

Conclusions. There are multiple cognitive factors which need to be considered when modifying CBT for children who have ID. Furthermore, research is required to test whether CBT so modified is effective in this population.

Practitioner points

Clinical implications

- Effective ways of providing cognitive behavioural therapy (CBT) to children with intellectual disability (ID) is unclear. This study provides a framework of potential adaptations for clinical practice
- As rates of mental illness for children with intellectual disability are high, and rates of treatment provision low, it is hoped that the recommendations provided in this study will encourage more mental health practitioners to provide CBT to children with ID.

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Limitations

- These recommendations are based only upon neuropsychological literature. Trialling the effectiveness of an adapted form of CBT for children and adolescents with ID is required.
- There are varying causes of intellectual disability, with differences in cognitive profiles. The utility of the recommendations made here may vary according to specific aetiologies.

Nearly half of children with intellectual disability (ID) have mental health disorders (Einfeld, Ellis, & Emerson, 2011; Tonge & Einfeld, 2000), yet there has been little focus on evidence-based psychological interventions for this population. Comorbid emotional and behavioural problems in children with ID are chronic if left untreated (Richardson & Koller, 1996) and can significantly impact upon future opportunities (Anderson, Lakin, Hill, & Chen, 1992; Parmenter, Einfeld, Tonge, & Dempster, 1998). Historically, it has been argued that people with ID were unable to engage in cognitive-based psychological therapy due to cognitive deficits (Adams & Boyd, 2010; Butz, Bowling, & Bliss, 2000; Sturmey, Lott, Laud, & Matson, 2005) with mental health interventions largely involving medication and behavioural techniques (Vereenoghe & Langdon, 2013). The need for adapting cognitive behaviour therapy (CBT) for adults with ID has been addressed (e.g., Willner & Lindsay, 2016), and recent studies have found CBT successful in treating mental health difficulties in adults with ID (e.g., Nicoll, Beail, & Saxon, 2013; Osugo & Cooper, 2016; Vereenoghe & Langdon, 2013), supporting its potential with younger age groups. This review seeks to consider how psychological therapy, specifically CBT, might best be adapted for children with ID.

The potential of CBT for children with ID comes from literature, indicating that some individuals with ID have the ability to identify and make links between thoughts, feelings, and behaviours, the fundamental elements of CBT (e.g., Dagnan, Chadwick, & Proudlove, 2000; Joyce, Globe, & Moody, 2006; Oathamshaw & Haddock, 2006; Reed & Clements, 1989; Sams, Collins, & Reynolds, 2006). Furthermore, CBT is the gold standard treatment for many psychopathologies for children without ID from early childhood through to late adolescence such as anxiety and depressive disorders (e.g., Cartwright-Hatton, Roberts, Chitsabesan, Fothergill, & Harrington, 2004; Compton *et al.*, 2004). The need to adapt CBT according to age as well as developmental level has been recognized for typically developing children (Garber, Frankel, & Herrington, 2016; Grave & Blissett, 2004). Consideration of a child's cognitive, social, and emotional development is crucial prior to undertaking therapy, in order to effectively tailor to the child's needs. As children with ID have unique cognitive profiles, as will be discussed below, it is imperative to adapt interventions according to their neuropsychological profile and developmental level, and not simply apply interventions developed for children of equivalent mental age (MA). Additionally, age within the context of childhood and development is important to consider, as children of different ages but with similar neuropsychological profiles may behave differently in similar situations. Thus, the implementation of CBT should take into consideration the above factors as indicated in Figure 1.

Over recent years with the development of third-wave cognitive and behavioural therapies, a range of techniques and elements have been collectively included under the umbrella of 'CBT' (Grave & Blissett, 2004; Ronen, 1997), including psychoeducation, goal setting, exposure with contingent reinforcement, coping and relaxation skills, identifying and linking thoughts with emotions, cognitive restructuring, homework, problem-solving skills, mood monitoring, emotion regulation strategies, and social problem-solving skills (e.g., Garber *et al.*, 2016; Hirshfeld-Becker, Micco, Mazursky, Bruett, & Henin, 2011;

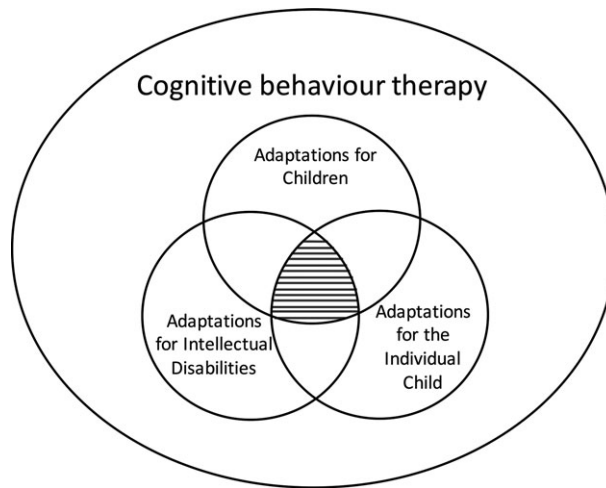


Figure 1. Cognitive behaviour therapy for children with intellectual disability (ID) should include adaptations made for typically developing children, children with ID, and those made for the individual child taking into account their individual neuropsychological profile and their personal presentation/context.

Wright, 2006). Behavioural techniques can include activity scheduling, pleasant event scheduling, graded exposure, exposure and response prevention, and relaxation strategies, while the cognitive techniques available include socratic questioning, guided discovery, examining evidence, identifying cognitive errors, generating alternatives, and thought change records (Wright, 2006). Thus, in considering the reduced cognitive functioning of children with ID, it is important to note that cognitive techniques need not be considered as 'all or nothing' (Willner, 2006). Cognitive techniques range in complexity (DiGiuseppe, 1981; Holmbeck, O'Mahar, Abad, Colder, & Updegrove, 2006; Sauter, Heyne, & Westenberg, 2009), and some may be more appropriate for particular clients than others (Merrell, 2001). The following review does not proceed to identify specific cognitive strategies which may be more or less effective for children with ID, as this depends to a large degree on the individual child, their profile of disability, their age, and their developmental level. Rather, the adaptations are suggestions clinicians may employ to facilitate the effective implementation of cognitive and behavioural strategies.

The aim of this study was to review the pertinent literature on the cognitive profiles typical of children and adolescents with mild to moderate ID and propose a developmentally informed framework for effectively implementing CBT with this population. Recommendations are made based upon a neurocognitive review with inclusions from literature examining CBT for adults with ID and developmental adaptations for typically developing children. As there can be significant variability within the profiles of children with ID, the proposed adaptations should be considered on an individual basis, and guided by a neuropsychological assessment and parent/carer reports.

Diagnostic criteria for intellectual disability

Children diagnosed with ID have significant impairments in intellectual and adaptive functioning (American Psychiatric Association, 2013). For the purpose of this paper, we focus adaptations for children specifically with a mild or moderate disability aged approximately 10 and older, as CBT is fundamentally more suited for individuals with

higher cognitive capacity. Thus, recommendations may need to be adjusted in practice when working with children of varying developmental and cognitive levels, as the pace of cognitive development can vary considerably from one individual to another (Everall, Bostik, & Paulson, 2005; Schrodtt & Fitzgerald, 1987). Within the context of childhood, age and developmental level may also have a significant role in the presentation of children with equivalent neurocognitive profiles.

Intellectual disability results from a range of different aetiologies, including genetic syndromes such as Down syndrome (DS), William's syndrome (WS), Fragile X syndrome, and unknown causes. Although aetiology-specific differences in cognitive profiles exist, this review aims to provide an overarching guide to conducting CBT with intellectually disabled children and adolescents, rather than provide aetiology-specific suggestions. Commonly, when assessing the cognitive functions of children with ID, chronological age (CA)-matched and/or MA-matched typically developing children are often used as comparison groups to determine the degree of deficit, if any. 'MA matched' refers to children who may have different CAs, but are matched according to their level of cognitive functioning. Such comparisons can provide information regarding whether a developmental delay is present. When compared with CA-matched children, those with ID consistently achieve lower cognitive scores. However, when compared with MA-matched controls, variation is found in their cognitive profiles. The sections below discuss the cognitive profiles of children with ID, considering their potential impact upon CBT and strategies which might be exploited in therapy. These recommendations are summarized in Table 1.

Method

This review considered studies identified through SCOPUS, PsycINFO, and PubMed databases, using combinations of the key words 'intellectual disability', 'learning disability', 'neuropsychology', 'attention', 'learning', 'memory', 'executive function', 'language', and 'reading', with no restriction set upon date. In addition, relevant studies in reference lists were used. Studies could include children with mild or moderate ID, or borderline intellectual functioning up to the age of 18. Of the studies identified, the most relevant are reviewed and discussed below.

Attention

Cognitive profile

Attention is poorer in children and adolescents with ID compared to typically developing children (Carrasco, Castillo, Aravena, Rothhammer, & Aboitiz, 2005; Leyfer, Woodruff-Borden, Klein-Tasman, Fricke, & Mervis, 2006; Rhodes, Riby, Matthews, & Coghill, 2011). Attentional abilities significantly influence learning and behaviour in children and adults with ID (Deutsch, Dube, & McIlvane, 2008; Simonoff, Pickles, Wood, Gringras, & Chadwick, 2007). Furthermore, attention deficit/hyperactivity disorder (ADHD) and symptoms of ADHD are more common in children with ID than typically developing children (Linna *et al.*, 1999; Voigt, Barbaresi, Colligan, Weaver, & Katusic, 2006).

Selective attention, sustained attention, and divided attention are three principal domains considered in ID attention research. Selective attention is the ability to select relevant stimuli from irrelevant stimuli, divided attention occurs when one is required to attend to two tasks at once, and sustained attention is the ability to maintain focus over time. Difficulties with all these areas of attention have been consistently reported for

Table 1. Key adaptations relating to each cognitive domain

Domain	Therapy adaptations
Attention	<ul style="list-style-type: none"> • Shorter, more frequent sessions • Include breaks • Reduce task length by dividing into smaller units • Engage children with a variety of modalities, colours, and pictures • Positively reinforce attention • Minimal distractions in therapy room • Begin with 'person-oriented' tasks before moving to 'task-oriented' exercises
Working Memory	<ul style="list-style-type: none"> • Use short, simple, subject–verb–object sentences • Present material verbally and visually • Use memory aids such as visual prompts • Present one task/activity at a time • Present information numerous times/repeat tasks
Learning and Memory	<ul style="list-style-type: none"> • Engage in implicit learning processes (e.g., role-play, hands-on activities) • Reality-based teaching; learn via 'doing' • Teach via modelling, using 'thinking out loud' when modelling • Frequently check understanding • Master skills before moving on • Practise and repeat skills • Provide immediate feedback • Record sessions or provide written summaries to the child and caregiver • Children encouraged to write events from the week to facilitate recall • Involve carers/parents to facilitate memory and recall
Executive Functions	<ul style="list-style-type: none"> • Therapist should plan and structure the sessions • Try to maintain a set structure to sessions • Use a visual schedule outlining session structure • Minimize switching between tasks • Target mental flexibility problem-solving and decision-making throughout therapy • Redirect uninhibited responses • Establish rules for therapy
Language and Reading	<ul style="list-style-type: none"> • Child should be facing therapist • Visual aids can assist communication • Use pictures/drawings to facilitate understanding, placed next to text with a clear link between text and image • Use 'Easy Reading' format for text • High-frequency connectives are more effective for ID (e.g., 'and') • Divide text into bullet points • Bold to emphasize main points • Avoid jargon • Define new terms where necessary • Sentences as short as possible (maximum 15 words) • Good contrast between colour of text and page • Sentences consisting a single concept • Words fewer than three syllables

children with ID (Djuric-Zdravkovic, Japundza-Milislavljevic, & Macesic-Petrovic, 2010; Määttä, Tervo-Määttä, Taanila, Kaski, & Iivanainen, 2006).

Some variations exist in the level of attentional deficit in ID, according to aetiology. For instance, poor selective attention, divided attention, and attentional shifting have been found specifically for children with Fragile X syndrome and DS (Munir, Cornish, & Wilding, 2000). Sustained attention is a relative strength for children with DS, WS, and Fragile X syndrome (they perform comparably to MA-matched controls) and auditory sustained attention is a particular strength of children with DS (Breckenridge, Braddick, Anker, Woodhouse, & Atkinson, 2013; Munir *et al.*, 2000).

Overall, it is evident that children with ID do display attentional deficits in comparison with their CA-matched peers, with aetiology influencing the degree of deficit.

Implications for therapy

Attentional deficits may serve as a significant obstacle in therapy if not accommodated and addressed. During therapy sessions, children are required to pay attention, usually for a sustained period of time. They are required to use sustained attention (e.g., to concentrate for the length of the therapy session), selective attention (e.g., to focus specifically on completing a task), alternating attention (e.g., when moving between describing their thoughts, to listening to the therapist, to completing a task), and divided attention (e.g., splitting attention between listening to the therapist and completing a task).

Proposed adaptations

To accommodate for deficits and maintain the attention of the children in therapy, shorter, more frequent sessions may be beneficial (Bailey, 2001). Depending upon the session length, a short break may also be necessary. Furthermore, reducing task length or dividing tasks into smaller, more manageable units can assist to sustain attention (Raggi & Chronis, 2006; Willner & Lindsay, 2016), as well as reduce frustration and increase persistence.

To also support attention, therapeutic activities in CBT should be as engaging as possible and include a variety of modalities (e.g., drawing, colouring, using technology such as computers and iPads, etc.), involving game-like tasks (Cunningham *et al.*, 2009; Grave & Blissett, 2004; Sauter *et al.*, 2009; Spence *et al.*, 2008; Stallard, 2005). Using stimulating materials with colours, pictures, and textures can help engage children with ID and focus them to specific tasks (Raggi & Chronis, 2006). Adding colour has been found to help with task stimulation in children with ADHD (Zentall, Falkenberg, & Smith, 1985; Zentall & Kruczek, 1988). Additionally, eye contact can be helpful to orient the child and focus their attention on the therapist before talking. Attention to tasks should also be rewarded using tangible and verbal reinforcements. It would be beneficial for the therapy room to have minimal distractions in order to maintain sustained and selective attention.

Children with ID tend to be more 'person-oriented' rather than 'task-oriented', indicating greater preference and responsiveness for working with people rather than working on tasks (Taylor, Sternberg, & Richards, 1995). As therapy largely involves interpersonal interactions, this is beneficial for therapists in their engagement of child clients with ID. Additionally, selective and sustained attention to tasks can improve as a child experiences greater success in performing a task (Heward, 2003). Thus, 'person-oriented' approaches can be used to initially engage a child with ID and help them experience them success in using the skill being taught, before moving to more 'task-focused' work.

Working memory

Cognitive profile

Working memory capacity is negatively affected in children and adolescents with ID (Henry, 2001; Schuchardt, Gebhardt, & Mäehler, 2010). Specifically, visuospatial working memory (the ability to store and manipulate visual information) and phonological working memory (the ability to store and manipulate auditory information) are cognitive domains explored in the ID literature.

Phonological working memory in particular is impaired in individuals with ID (Schuchardt, Maehler, & Hasselhorn, 2011). The phonological loop holds auditory information in the short-term memory store via rehearsal of that information. The deficit observed is attributable to storage capacity, and not the result of an inaccuracy in processing. A reduced phonological store has implications for learning, such that less information is entered, processed, and stored in long-term memory (Schuchardt *et al.*, 2011). However, in comparison with MA-matched controls, children with ID do not appear to have additional difficulty in binding information from long-term memory with information from working memory and the phonological loop, as well as maintaining and recalling these new representations (Henry, 2010). Thus, while deficits are apparent in working memory, particularly pertaining to the phonological loop, the ability of children and adolescents with ID to integrate new information with long-term memories is not compromised.

It is consistently found that verbal immediate memory is more impaired in children with DS than with WS, while spatial immediate memory is more impaired in children with WS than with DS (Edgin, Pennington, & Mervis, 2010; Jarrold, Baddeley, & Hewes, 1999; Wang & Bellugi, 1994). The impairment in the visuospatial sketchpad for children with WS has been found to broadly impact upon naming visual stimuli as well as the location in which they were presented following a 5-s delay (O'Hearn, Courtney, Street, & Landau, 2009). Additionally, on tasks assessing associative memory, children with WS were more impaired than children with DS, and these associative memory deficits for children with WS were apparent in both verbal and spatial domains (Edgin *et al.*, 2010). Overall, the phonological working memory abilities and articulatory loop of children with WS are relatively intact when compared to MA controls (Vicari, Carlesimo, Brizzolara, & Pezzini, 1996). Global impairments in both the phonological loop and visuospatial sketch pad are displayed when compared to CA-matched controls (Sampaio, Sousa, Fernández, Henriques, & Gonçalves, 2008).

Implications for therapy

During a therapy session, children are constantly required to use working memory to not only attend and listen to a therapist, but also store the information which they hear and then use it in a way which is applicable to their situation. They have to 'work' with information presented either verbally or visually. Often, as the session progresses, they are required to recall information from memory stores and apply it to the current task.

As working memory deficits have been found in children with ID, this would likely serve as a barrier to effective psychological treatment. A reduced phonological store means that less verbal information is entered, retained, and processed into long-term memory. Consequently, a child's knowledge base is expanded more slowly. This means that the overall therapy process may take longer than with typically developing children and/or that specific skills may take longer and more repetitions to master.

Proposed adaptations

Working memory impairments can be accommodated for by reducing verbal demands using short, simple instructions which are subject–verb–object sentences (e.g., ‘Sally goes to school’) (Gathercole, Lamont, & Alloway, 2006) and using non-verbal techniques (Stallard, 2005). The use of memory aids and visual reminders can be beneficial for children who have greater difficulty processing verbal instructions (Gathercole *et al.*, 2006). Due to visuospatial and phonological working memory deficits, information should be presented both verbally and visually to increase the likelihood of understanding and facilitate processing.

Working memory loads can also be managed by presenting one task or activity at a time to children (Gathercole *et al.*, 2006). In order to manage verbal and non-verbal executive loads, visual and verbal distractions should be limited, with only relevant stimuli presented. Additionally, pictures and drawing may be useful to aid memory retention (Cherry, Applegate, & Reese, 2002). Multiple presentations of information can assist in transferring information from working memory and short-term memory into long-term memory. Additionally, the duration of therapy may need to be extended, and specific skills may need to be repeated to support learning (Willner & Lindsay, 2016).

Learning and memory

Cognitive profile

Learning and memory abilities are found to be compromised in children with ID. Deficits in explicit memory processes exist for children with ID (Bebko & Luhaorg, 1998; Bray & Turner, 1986; Carlesimo, Marotta, & Vicari, 1997; Meador & Ellis, 1987). Children with ID learn simple, small chunks of information better when provided with implicit instructions rather than explicit instructions (Witt & Vinter, 2013). When learning more complex information however, both children with ID and typically developing children are less successful learning via implicit instructions. The retrieval and recognition of complex information is also compromised in children with ID, regardless of whether it is taught implicitly or explicitly (Witt & Vinter, 2013).

Specifically, explicit memory for children with DS is poorer than for children with ID not the result of DS. This effect is evident on verbal, non-verbal, immediate, and delayed explicit memory tasks (Carlesimo *et al.*, 1997). Furthermore, using semantic strategies to encode information among children with DS was found not to enhance the performance of children with DS, such that they did not differ on their performance when required to recall related or unrelated words; however, they were better at recognizing words than recalling them (Carlesimo *et al.*, 1997). Thus, for individuals with DS, there is a deficit in the deliberate retrieval of stored information (Carlesimo *et al.*, 1997).

Implications for therapy

Memory and learning contribute greatly to the capacity a child has to acquire and process new information. This is important as during CBT sessions, children learn skills, for example, thought challenging (examining the validity and helpfulness of negative thoughts). Children are required to remember information from sessions in order to learn it and be able to apply it outside of the therapy sessions. Children may also be asked to recall and explain past events to the therapist, remember to do their homework, and remember what was addressed during the session. Thus, memory and learning are significant cognitive functions which underpin much of the therapy process.

Proposed adaptations

Therapists should aim to utilize implicit learning processes such as learning through role plays and hands-on activities (Witt & Vinter, 2013). Teaching should be reality-based where possible, that is, learning in an environment which uses present data and information from a client (D'amico *et al.*, 2005; Sauter *et al.*, 2009), allowing for the indirect challenging of cognitions. To acquire new skills, children should experience the learning process first hand (Westwood, 2008). Initial modelling by the therapist can be effective when conducting these sorts of activities, using 'think out loud' for demonstrations (Westwood, 2008), followed by therapist-assisted activities. Therapist assistance should be gradually withdrawn as the child becomes more confident using the skills, eventually resulting in independent practice.

To facilitate generalizing learning from one setting to another, therapists should try closely replicating actual stimuli and responses found in natural settings (Browning, White, Nave, & Barkin, 1986) and use multiple teaching examples (Neef, Lensbower, Hockersmith, DePalma, & Gray, 1990). If a skill can become learnt such that it is automatic, less planning and executive load will be required to apply it. It is also recommended that strategies be practised with different examples, and in a variety of contexts to facilitate generalization (Westwood, 2004, 2008). The therapist should ensure that skills are mastered before moving on, by frequently checking the child's understanding (Westwood, 2008). Using multiple modalities (e.g., a combination of talking with the therapist, doing role plays, using technology, etc.) can be used to provide variability and interest while practising the same skill, although it is important the therapist be mindful to not significantly increase cognitive load by doing this. Parents/carers' involvement in therapy can facilitate and reinforce the practice of skills outside of sessions (Angelosante, Pincus, Whitton, Cheron, & Pian, 2009; Bromley & Mellor, 2012; Hoffman & Mattis, 2000; Ollendick, 1995; Sauter *et al.*, 2009).

Children can be asked to paraphrase information and directions to ensure understanding (Shillingford-Butler & Theodore, 2013). Additionally, it is important that the therapist allow the child time to think about a question and answer to allow for memory recall before assisting them. However, when a child does provide an answer or completes an activity, immediate feedback by the therapist will facilitate learning (Westwood, 2008). Children with ID may need more time to complete tasks (Hartman, Houwen, Scherder, & Visscher, 2010), and thus, a greater number of therapy sessions may be required than when working with typically developing populations.

To accommodate for memory weaknesses, homework should be written down and communicated to a parent/caregiver. Recording sessions or providing a summary may also be useful in reminding the child what has been covered. Finally, caregivers should assist children to write or draw important events which occur during the week to aid recall (Willner & Goodey, 2006; Willner & Lindsay, 2016).

Executive functions*Cognitive profile*

Executive functioning refers to higher-level abilities of planning, problem-solving, mental flexibility, inhibition, initiation, judgement, and abstract reasoning (Kreutzer, Caplan, & DeLuca, 2011). Children with ID often have delays in a number of areas of executive functioning, including inhibition, shifting, emotional control, initiation, working

memory, planning, organization, monitoring, decision-making, and problem-solving (Danielsson, Henry, Messer, & Rönnerberg, 2012; Hartman *et al.*, 2010; Memisevic & Sinanovic, 2014). Memisevic and Sinanovic (2014) found initiation and working memory to be lowest, indicating that children were poor at beginning tasks, independently creating ideas, problem-solving, and mentally manipulating information.

Danielsson *et al.* (2012) compared the performance of children with ID on a range of tasks measuring executive functioning, relative to CA- and MA-matched controls. Children with ID performed significantly lower than CA-matched comparisons on all tasks of executive functioning. However, their performance on tasks of switching, verbal executive-loaded working memory, and most fluency tasks (except for lexical fluency) were found to be comparable to the scores of MA-matched children. On tasks measuring inhibition, planning, and non-verbal executive-loaded working memory however, children with ID scored lower than MA-matched controls.

Response inhibition involves the ability to suspend a response during active moment-to-moment behaviour. Greater inhibitory control in children with ID has been found predictive of conceptual and practical adaptive skills (Gligorović & Buha Đurović, 2014). Specifically, Lanfranchi, Jerman, Dal Pont, Alberti, and Vianello (2010) found children with DS showed deficits in inhibition compared to MA-matched controls, with children with DS producing a greater number of errors overall on a Stroop-type task. Children with WS also show significant impairment compared to MA controls on a verbal opposites test, a task which measures verbal inhibition, while children with DS performed equivalent to MA controls (Breckenridge *et al.*, 2013).

In relation to set shifting, that is, the ability to mentally move back and forth between different tasks, children with ID perform on par with their MA-matched peers (Danielsson *et al.*, 2012). For children with DS specifically, performance on tasks of shifting is poor (e.g., Contestabile, Benfenati, & Gasparini, 2010; Memisevic & Sinanovic, 2014; Vinter & Detable, 2008). Additionally, planning has been found to be significantly impaired for children with ID including children with DS (Danielsson *et al.*, 2012; Lanfranchi *et al.*, 2010). This is in line with research supporting that cognitive flexibility is related to the development of planning in children (McCormack & Atance, 2011; Rattermann, Spector, Grafman, Levin, & Harward, 2001). Thus overall, it appears that the executive functions within children with ID are compromised.

Implications for therapy

Executive functions are often discretely used during therapy sessions. A therapist may shift from discussing one concept to another, or may move from one task to the next, requiring a degree of mental flexibility in the client. Similarly, children are sometimes required to do tasks which require planning, such as recalling events, completing a sequence of steps in an activity, or implementing strategies outside of sessions. In CBT, problem-solving is frequently used, though often facilitated by the therapist. Additionally, children may be required or expected to inhibit certain responses and behaviours during therapy.

Proposed adaptations

To accommodate for deficits in planning, initiation, and mental flexibility, therapy sessions should be largely guided by the therapist, with children required to do little planning (Willner & Lindsay, 2016). Although CBT typically involves a structured session

approach (e.g., begin by reviewing homework, introducing a skill, practising the skill, etc.), this may need to be utilized more than typical, with a visual schedule displaying the agenda for the session and placed in an obvious location to reduce cognitive load. Increased structure and predictability are beneficial in other groups with executive and attentional deficits, using schedules, giving explicit instructions, and providing one instruction at a time (Raggi & Chronis, 2006). Consistency of the location, time, and day of sessions can facilitate the development of a familiar routine for the child (Beail & Jahoda, 2012).

To further accommodate for weaknesses in mental flexibility and shifting, therapists might minimize asking the child to shift between tasks if not necessary. However, cognitive rigidity can also be addressed as a target within CBT. Cognitive rigidity can be a contributing factor to mental health concerns (e.g., Kashdan & Rottenberg, 2010; Schultz & Searleman, 2002). For example, individuals may view situations from a 'black or white', or 'all or nothing' perspective. In these cases, mental flexibility and perspective should be addressed within treatment. As individuals with ID may find it difficult to deal with therapists challenging their beliefs (Willner, 2006), taking time to establish a solid therapeutic relationship will be beneficial. Similarly, developing problem-solving and decision-making skills may also be targets to develop throughout therapy. Concrete examples and exercises can support deficits in abstract reasoning and problem-solving tasks (Ratcliffe, 2011; Stallard, 2005).

Clinical experience suggests poor response inhibition may be displayed in children with ID during therapy sessions. They may be impulsive in their actions or interrupt the therapist. This can be managed by redirecting focus and establishing rules for therapy (e.g., do not interrupt the other person while they are speaking). Rules should be clear and brief with visual reminders for appropriate behaviours (Simonsen, Fairbanks, Briesch, Myers, & Sugai, 2008), and phrased according to how the child is expected to behave rather than how *not* to behave. Promoting independent learning and self-regulation can be facilitated through the use of visual cues, audio cues, and recordings to provide instructions to the child as they complete a task.

Language and reading

Cognitive profile

Children with ID often show delays in language development, with weaknesses identified for speech production, syntax, intelligibility of speech, and vocabulary (Facon, Facon-Bollengier, & Grubar, 2002; Mervis & John, 2008; Roberts, Price, & Malkin, 2007; Ypsilanti & Grouios, 2008). There appears to be a relationship between phonological working memory and the development of vocabulary in children with ID (Jarrold, Baddeley, Hewes, Leeke, & Phillips, 2004; van der Schuit, Segers, van Balkom, & Verhoeven, 2011). While in typically developing children, the development of phonological working memory, syntax, and vocabulary is relatively autonomous, a different model of development is found for children with ID (van der Schuit *et al.*, 2011). A positive relationship between working memory and vocabulary has been seen at the age of five, indicating that phonological working memory difficulties may result in restricted vocabulary growth.

Reading difficulties are also often present, affecting up to 67% of children with ID (Koritsas & Iacono, 2011). Children with ID perform lower on word recognition, comprehension, phonological processing, non-word reading, and phonological decoding tasks (Bos & Tierney, 1984; Cawley & Parmar, 1995; Channell, Loveall, & Connors, 2013;

Jenkinson, Copeland, Drivas, Scoon, & Yap, 1992; Verucci, Menghini, & Vicari, 2006), but similarly to typically developing children on orthographic processing (using the visual system to read and write), and rapid automatized naming (the speed at which individuals can name objects) (Channell *et al.*, 2013). Thus overall, children and adolescents with ID present with significant deficits in language, communication, and reading.

Implications for therapy

As CBT is primarily a ‘talking therapy’, adaptations may need to be made to language and communication. A limited vocabulary may hinder communication and understanding during the therapy sessions. Children with ID may not be able to adequately express themselves, and may struggle to understand the therapist if they use words outside of their vocabulary. Similarly, as worksheets may be provided to clients, it is important to know their reading/writing abilities and whether such tasks are appropriate and effective.

Proposed adaptations

To maximize understanding and communication, the child should face the therapist wherever possible. The use of visual aids, pictures, puppets, and drawings can assist communication between the therapist and child, particularly if expressive and receptive communication difficulties are present, or serve as prompts (Cherry *et al.*, 2002; Stallard, 2005). For example, when engaging with the child about cognitions, visual aids using thought bubbles to represent cognitions can be used (Beail & Jahoda, 2012).

If written text is used, it is recommended that it is adapted in an ‘Easy Reading’ format to make reading activities more effective and enjoyable (Karreman, Van Der Geest, & Buursink, 2007; Mastropieri & Scruggs, 1992). Fajardo, Tavares, Ávila, and Ferrer (2013) found that when adapting texts, high-frequency connectives should be used, particularly connectives which are additive (e.g., ‘and’) or contrastive (e.g., ‘but’). It may also be useful for therapists to read texts out loud. If a computer or other device is being used, programs which read the text on the screen are recommended.

Bullet points and bold font can add clarity and emphasize main points in written texts. Good contrast should also be provided between the words and the page. Pictures used should be placed next to the accompanying text, and written sentences should be as short as possible, of no more than 15 words, while verbal communication should also consist of short sentences containing a single concept and words fewer than three syllables (Lindsay, Jahoda, Willner, & Taylor, 2013). Overall, language should be simplified and jargon avoided (Angelosante *et al.*, 2009; Hoffman & Mattis, 2000) and where possible, using the child’s terminology can be helpful (Stallard, 2005).

Conclusion

There are multiple cognitive, executive, and communication factors which need to be considered before engaging in CBT with children who have ID, in order to maximize the effectiveness of therapy. Impaired cognitive functions, including attention, memory, executive functioning, and language and communication deficits may all need to be accommodated.

It is evident that children with ID do have deficits which would impact upon the process and effectiveness of CBT. However, these deficits should be viewed not as barriers

and reasons as to why children should not engage in therapy, but rather as challenges which can be accommodated for with the necessary adaptations provided by the therapist, and using such recommendations to design individualized treatment plans. Due to differences in the profiles of some children with ID, future research should examine syndrome-specific adaptations of CBT. Furthermore, future research should focus on implementing adaptations into therapy, trialling the effectiveness of an adapted form of CBT, and evaluating the impact it has upon mental health issues in children with ID.

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Received 21 September 2016; revised version received 28 February 2017