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A Review of Intervention Programs to Prevent and Treat Behavioral Problems in Young Children with Developmental Disabilities

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Abstract

Children with developmental disabilities are at higher risk for internalizing and externalizing behavioral problems than children in the general population. Effective prevention and treatment programs are necessary to reduce the burden of behavioral problems in this population. The current review identified 17 controlled trials of nine intervention programs for young children with developmental disabilities, with parent training the most common type of intervention in this population. Nearly all studies demonstrated medium to large intervention effects on child behavior post-intervention. Preliminary evidence suggests interventions developed for the general population can be effective for children with developmental disabilities and their families. A greater emphasis on the prevention of behavior problems in young children with developmental disabilities prior to the onset of significant symptoms or clinical disorders is needed. Multi-component interventions may be more efficacious for child behavior problems and yield greater benefits for parent and family adjustment. Recommendations for future research directions are provided.

Keywords

Developmental disabilities; Preventive interventions; Treatment; Mental health; Behavioral problems

Introduction

Developmental disabilities encompass a wide range of conditions, of both known and unknown etiology, that delay or impair an individual's physical, cognitive, and/or psychological development (Sandman and Kemp 2007). These disabilities are lifelong and impact multiple domains of functioning such as learning, language, mobility, self-direction, self-care, capacity for independent living, and economic self-sufficiency (Administration on Developmental Disabilities 2011). Common developmental disabilities include autism spectrum disorders, intellectual disabilities, fetal alcohol spectrum disorders (FASD), Down's syndrome and other genetic disorders, general developmental delay, and cerebral palsy. Behavioral problems among children with developmental disabilities can exacerbate functional difficulties and lead to more restrictive environments and a greater emotional and financial burden on individuals, families, and communities (Roberts et al. 2003; Saloviita et al. 2003; Tonge and Einfeld 2000). The prevalence of internalizing (i.e., anxiety, depression) and externalizing (i.e., aggression, noncompliance) behavior problems in young children with developmental disabilities is estimated between 40 and 64 % (based on clinical cut-points on behavior rating scales), which is about 2 to 4 times higher than rates in the general population (National Research Council and Institute of Medicine 2009; Roberts et al. 2003; Tonge 2007). Clearly, effective prevention and treatment programs are necessary to reduce

the burden of behavioral problems in this population. This review will evaluate the evidence for the efficacy of existing programs targeting the prevention or treatment of behavioral problems in young children with developmental disabilities and will highlight areas for future investigation.

Quantifying and categorizing behavioral problems in children with developmental disabilities can be challenging. Children with mild developmental disabilities are more likely to have behavior problems that resemble those of typically developing children (Tonge 2007). It becomes increasingly difficult to apply existing diagnostic criteria to behaviors displayed by children with more severe developmental disabilities. Furthermore, many developmental disabilities are accompanied by characteristic behaviors that may overlap with recognized mental health and behavioral disorders. The use of the terms comorbidity or dual diagnosis is controversial because it is unclear whether the child is displaying two or more separate disorders or variable manifestations of one underlying impairment (Gilger and Kaplan 2001). In light of this controversy, the current review will focus on levels of behavior problems rather than rates of specific diagnostic categories. This decision is in line with how intervention effects are typically quantified in the field (i.e., behavior checklists, frequency of observed behaviors). In addition, both internalizing and externalizing behavior problems will be discussed when included in studies.

Preventive Interventions

Research has documented the presence of elevated rates of behavioral problems in children with developmental disabilities as young as 3 to 4 years of age (Tonge 2007). These findings emphasize the need for early intervention to prevent and treat behavioral problems in this population. The emotional and financial burden for individuals and families can be greatly reduced if the onset of behavioral problems can be prevented or the severity lessened. From a public health perspective, prevention is more effective than intervening after problems have already emerged. The Institute of Medicine has adopted a prevention framework consisting of three levels: 1) universal, 2) selected, and 3) indicated (National Research Council and Institute of Medicine 2009). Universal preventive interventions incorporate strategies targeting the general population, which are likely to provide some benefit to all (e.g., school-based programs offered to all children to teach social and emotional skills; media campaigns). Selective preventive interventions target individuals within a population who are identified as having a higher risk of developing behavioral disorders, but who do not yet have symptoms (e.g., program offered to children exposed to risk factors such as parental mental illness, divorce, or maltreatment). Indicated preventive interventions target high-risk individuals who are displaying early signs or symptoms of a behavioral disorder, but who do not meet diagnostic levels for the disorder. Given the increased risk of behavioral problems for individuals with developmental disabilities, the majority of preventive interventions used with this population would be classified as selected or indicated. Some researchers have argued that indicated prevention should also include individuals with a diagnosed disorder when interventions emphasize the prevention of comorbidity or disability (National Advisory Mental Health Council Workgroup on Mental Disorders Prevention Research 1998). The current review will utilize this broader definition of indicated prevention.

Preventive interventions are designed to target key risk and protective factors that contribute to the development and maintenance of problem behaviors. Risk and protective factors can occur and interact at multiple levels and contexts including individual factors (ontogenic development; e.g., affect regulation, development of self), family and school contexts (microsystem; e.g., parental psychopathology, maltreatment, supportive caregiving, quality schools), the community environment (exosystem; e.g., community violence, poverty), and influences from broader cultural and societal values (macro-system; e.g., societal view of

disability, resources and supports available; Bronfenbrenner 1979; Cicchetti and Toth 1997; Sameroff 2000). Interventions are likely to be most effective when risk and protective factors at multiple levels or contexts are considered (Carr et al. 2002; Coie et al. 1993; Nation et al. 2003). Identifying the risk and protective factors that contribute to problem behaviors for a given population is critical to developing effective prevention strategies.

Factors Influencing Child Behavior Problems and Family Functioning

A number of risk and protective factors are associated with behavioral problems in young children with developmental disabilities. Some of these factors are similar to those identified for typically developing children, while others are related to the characteristics or severity of the child's disability. Individual-level risk and protective factors identified in children with developmental disabilities have included the level of intellectual or adaptive functioning, diagnosis/etiology, severity, mobility, sex, and age (e.g., Chadwick et al. 2008; Dekker and Koot 2003; Koskentausta et al. 2007; McClintock et al. 2003; Mitchell and Hauser-Cram 2009; Streissguth et al. 2004). However, findings have been mixed, which is likely due in part to the heterogeneity within and between samples and how constructs are operationalized and measured across studies. It is also possible that the same factor functions differently for developmental disabilities of different etiologies and/or presentations. For example, research with individuals with mild to moderate intellectual disabilities or autism spectrum disorders have found lower IQ scores to predict higher levels of internalizing behavior problems (Koskentausta et al. 2007; Mitchell and Hauser-Cram 2009; van Steensel et al. 2011). In contrast, having a relatively lower IQ is associated with fewer mental health problems in children with FASD (Streissguth et al. 2004). Additional studies are needed to more clearly delineate the complex pattern(s) of risk and protective factors for individuals with developmental disabilities.

Many family- and community-level factors that convey risk or protection for behavioral problems in the general population (e.g., Coie et al. 1993; Durlak 1998; National Research Council and Institute of Medicine 2009) have also been identified for individuals with developmental disabilities. Identified risk factors include harsh or inconsistent parenting, maltreatment, low socio-economic status, single-parent household, parent psychopathology, and stressful life events (e.g., Chadwick et al. 2008; Dekker and Koot 2003; Koskentausta et al. 2007; Mitchell and Hauser-Cram 2009). Receipt of developmental disability services, early diagnosis, not being a victim of violence, and a harmonious and cohesive family climate are generally protective against behavioral problems in individuals with developmental disabilities (e.g., Mitchell and Hauser-Cram 2009; Streissguth et al. 2004).

A growing body of research has also focused on the functioning and adaptation of families raising children with developmental disabilities, and has highlighted characteristics that are relevant for intervention design. Relative to the general population, some studies have found that parents of children with developmental disabilities have increased risks for parental distress (Baker et al. 2003; Saloviita et al. 2003), maternal depression (Bailey et al. 2007; Singer and Floyd 2006), physical health problems (Miodrag and Hodapp 2010), marital discord/divorce (Risdal and Singer 2004), and social isolation (Embregts et al. 2010). Despite documented increased rates of poorer parental functioning, there is extensive variability among families and many adapt well to having a child with developmental disabilities (e.g., Hastings and Taunt 2002; Risdal and Singer 2004; Yau and Li-Tsang 1999). While raising a child with developmental disabilities can be more stressful, families of children with disabilities have similar or higher levels of positive perceptions and experiences as those of families with typically developing children (Hastings and Taunt 2002). These positive perceptions may be an effective coping resource, and therefore may be an important target for intervention. Other characteristics of families who have successfully adapted to having a child with developmental disabilities include having a small, intense

social network, a two-parent family with few children, higher socioeconomic status, living in a community with high acceptance of disability, availability of resources for crisis situations, good individual parent coping skills, spousal support, good parenting skills, and involvement in a parent support group (Yau and Li-Tsang 1999). Some of these characteristics may be good targets for preventive interventions.

Delivery of Preventive Intervention Programs

Preventive interventions can be delivered in a variety of formats (e.g., individual, family, group, self-directed) and settings (e.g., in-home, school, community center, mental health clinic). Given the nature of risk and protective factors facing young children, the two most common types of delivery methods include parent training and school-based interventions. Parenting interventions stemmed from research on family interactions. This body of research identified that harsh and inconsistent parenting practices contributed to aggressive and uncooperative child behaviors whereas positive parent-child interactions and reinforcement of desirable behaviors contributed to prosocial and cooperative child behaviors (Kazdin 1997; Patterson et al. 1989). Evidence for the link between positive parenting styles and more adaptive child functioning has also been documented for young children with developmental disabilities (Dyches et al. 2012). Given that aggressive and uncooperative behavior is a risk factor for both externalizing and internalizing behavior problems in children (National Research Council and Institute of Medicine 2009), parenting interventions have a strong theoretical rationale in the prevention and treatment of behavioral problems in young children. Considerable research supports the efficacy of parenting interventions in treating and preventing aggressive or oppositional behavior for typically developing children (Kaminski et al. 2008; Kazdin 1997; Serketich and Dumas 1996). Parenting program components that are consistently associated with the largest effects include increasing positive parent-child interactions and communication skills, teaching parents to use time out and consistent discipline strategies, and providing parents opportunities to practice new skills with their children in training sessions (Kaminski et al. 2008).

Childcare centers and schools are often optimal settings for interventions with young children since curricula can be naturally integrated within the school day and the majority of children in this age group can be reached. School-based interventions have the potential to contribute to children's competent development by providing nurturance, teaching cooperative social skills, and enhancing cognitive and emotional growth (National Research Council and Institute of Medicine 2009). The majority of school-based interventions have focused on preventing behavioral problems or promoting positive child behavior. Across interventions, effect sizes tend to be the greatest for high-risk groups and for programs targeting preschool and early elementary school-age children (versus middle and high school students; Centers for Disease Control and Prevention 2007; National Research Council and Institute of Medicine 2009; Wilson and Lipsey 2007).

Interventions incorporating multiple components are becoming increasingly prevalent for preventing and treating behavioral problems in children (Greenberg et al. 2001). These interventions typically target risk and protective factors across multiple environments (child, school, family, neighborhood) and multiple socialization agents (parents, teachers, peers). A number of multi-component interventions have been shown to be cost effective for typically developing children (National Research Council and Institute of Medicine 2009).

Focus of the Current Review

The current review will focus on identifying interventions targeting the prevention or treatment of behavioral problems in young children (ages 3 to 8) with developmental

disabilities. Both selected (i.e., at risk) and indicated (i.e., treating existing behavioral problems) interventions will be included in the review. Interventions are reviewed by delivery format (i.e., parenting, school-based, and multi-component interventions).

Methods

Studies were selected for review if they met the following inclusion criteria: 1) included children between the ages of 3 and 8 years old with developmental disabilities or their families; 2) focused on the prevention or treatment of internalizing or externalizing behavioral problems; 3) utilized a manualized intervention program; 4) evaluated the efficacy of the intervention using a randomized controlled trial or quasi-experimental controlled design; and 5) were published in an English-language, peer-reviewed journal between 1990 and 2011. For the purposes of this review, developmental disability was defined as a condition of known or unknown etiology that impairs multiple domains of a child's functioning and is expected to be life-long. This definition encompasses children with conditions such as intellectual disabilities, autism spectrum disorders, Downs syndrome and other genetic disorders, global developmental delay, and fetal alcohol spectrum disorders (FASD). Children with specific learning disabilities, specific language impairment, or attention deficit hyperactivity disorder are not included in this definition.

Studies utilizing single-subject designs were excluded from this review, as the majority of these studies focus on specific behavioral techniques and settings versus manualized intervention programming (for reviews see Brosnan and Healy 2011; Didden et al. 1997; Hayvaert et al. 2012). The prevention of developmental delay in at-risk children (e.g., due to poverty) is also beyond the scope of this review and has been reviewed elsewhere (see Anderson et al. 2003).

Several methods were utilized to identify studies for inclusion. Electronic searches were conducted using PsychInfo, Medline, and ERIC. Search terms are listed in Table 1. Boolean operators were used to search multiple terms; the "OR" command was used to include terms in the same column and the "AND" command was used to combine columns. Online databases of empirically supported treatments published by various national organizations (i.e., SAMHSA National Registry of Evidenced-based Programs and Practice; Child Trends LINKS database; RAND Corporation Promising Practices Network) were also examined for additional intervention programs utilized for children with developmental disabilities. Reference sections of selected studies were examined to ascertain any other possible studies for inclusion. Intervention developers' websites were also reviewed to identify additional studies published using the intervention. A total of 17 studies representing 9 intervention programs were identified that met inclusion and exclusion criteria. Studies are reviewed by delivery method: 1) parenting interventions, 2) school-based interventions, and 3) multi-component interventions. Effect sizes are included when reported.

Results

Parenting Interventions

The majority of parenting interventions evaluated for children with developmental disabilities have been adapted from interventions designed for typically developing children or those at risk for developmental or behavioral disorders. Most parenting programs detailed below would be classified as indicated prevention, as families were selected based on their child's developmental disability and existing behavioral problems. McIntyre's (2008a) adaptation of *The Incredible Years* is an exception and was the only parent training study with a stated prevention focus. See Table 1 for details of studies meeting inclusion criteria.

Incredible Years—The *Incredible Years Parent Training Program* (IYPT; Webster-Stratton 2001) has been extensively studied for the prevention and treatment of childhood conduct problems. It was designated as an efficacious treatment by the American Psychological Association (Brestan and Eyberg 1998) and was selected as one of the 10 *Blueprint for Violence Prevention Programs* (Webster-Stratton et al. 2001). IYPT is typically delivered over the course of 12 weeks in a group format with 8 to 12 parents per group. Sessions cover topics including play, praise, rewards, limit setting, and handling challenging behavior. Skills are taught through group discussion, videotaped vignettes of parent–child interactions, role-playing, didactics, and weekly homework assignments.

One study to date (McIntyre 2008a) has evaluated IYPT with families of young children (ages 2 to 5, $N=49$) with developmental disabilities of mixed etiologies (39 % autism). Children did not have to have current behavioral problems for families to participate. A few modifications were made to the standard IYPT (IYPT-DD) including using the Toddler Program curriculum due to the developmental level of the children, asking parents to identify key points that could be generalized to their children with developmental delays versus those that did not seem applicable, excluding the content on time-out, focusing on predicting and avoiding problem behavior, and providing informational handouts on developmental disabilities resources in the community (McIntyre 2008b). Good intervention fidelity and inter-rater reliability for observation measures were reported. Immediately post-intervention, parents who received IYPT-DD demonstrated greater decreases in observed inappropriate or negative parenting behaviors than parents on the wait-list control group ($\eta^2=.37$). Their children also showed modest declines in parent-reported behavior problems (total problems $\eta^2=.11$), especially internalizing symptoms ($\eta^2=.12$). Intervention effects did not significantly differ for children with autism versus other developmental disabilities. Parents were generally satisfied with the program and had good attendance to group sessions (McIntyre 2008a). No follow-up evaluations of IYPT-DD have been published to date.

Stepping Stones Triple P—*Stepping Stones Triple P* (SSTP; Sanders et al. 2004) is part of the *Triple P – Positive Parenting Program* series that was specifically designed for parents of children with developmental disabilities between the ages of 2 and 12. Like other programs within the Triple P system, SSTP consists of five levels of intervention strength developed to cater to the level of support appropriate for different families. Intervention levels range from universal media campaigns to behavioral family interventions targeting concurrent child behavior and parent adjustment problems (see Sanders et al. 2004 for more information on levels). To date, empirical studies on levels 2 (selected, SSTP-SC), 4 (standard, SSTP-ST) and 5 (enhanced, SSTP-EN) have been published with families of children with developmental disabilities. SSTP-SC provides specific advice to parents on common child development issues and minor behavior problems through brief contact with a practitioner (e.g., 2 sessions for 20 min) or seminars. Both SSTP-ST and SSTP-EN contain 8–10 sessions focused on identifying the causes of child behavior problems, training in 14 child development strategies (e.g., quality time, praise, tangible rewards, activity schedules, incidental teaching, behavior charts) and 11 behavior management strategies (e.g., diversion, setting rules, planned ignoring, clear and direct instructions, logical consequences, time-out), and active practice and individualized feedback from the therapist in these techniques. SSTP-EN includes additional sessions to address parent adjustment or family dysfunction (e.g., adjustment to child's disability, parent coping skills, marital distress, social support). SSTP interventions were developed to be delivered in individual, group, or self-directed (with or without telephone assistance) formats (Sanders et al. 2004). All four RCTs conducted on versions of SSTP have been conducted by the same research group based in Australia (Roberts et al. 2006; Plant and Sanders 2007; Sofronoff et al. 2011; Whittingham et al. 2009). Families were recruited primarily through advertising through relevant early

intervention programs. Children with developmental disabilities were more likely to be male.

One RCT has evaluated SSTP-SC with parents ($N=70$) of children with developmental disabilities of mixed etiologies (45 % autism; Sofronoff et al. 2011). All outcomes were assessed with parent-reported measures. Parents who received the intervention, which consisted of two 90-minute seminars, reported decreased child behavior problems ($d=0.35$), improved parenting styles (overreactivity $d=0.54$, verbosity $d=0.49$), and decreases in conflict about child rearing with their partner ($d=0.44$) relative to parents who were in the wait-list control group. No treatment effects were found for parent stress or adjustment. Effect sizes for significant findings were generally in the medium range. The majority of treatment effects were maintained in the intervention group at follow-up 3 months later.

Three RCTs with wait-list control designs have been published on the efficacy of the more intensive versions of SSTP with parents of children with developmental disabilities (Roberts et al. 2006; Plant and Sanders 2007; Whittingham et al. 2009). Two studies (Plant and Sanders 2007; Roberts et al. 2006) included children with developmental disabilities covering a range of etiologies (both known and unknown) and one study (Whittingham et al. 2009) focused on children with autism spectrum disorders. Although not all studies required children's level of behavior problems to reach a specified clinical cut-off for inclusion in the study, pre-existing child behavior problems were a focus of participant recruitment in all studies. Two studies included both observational and parent-report outcome measures (Plant and Sanders 2007; Roberts et al. 2006) whereas the third relied only on parent-report (Whittingham et al. 2009). In all three efficacy trials, positive intervention effects were seen for child behavior problems (although not always consistently across similar measures). Some improvements in parenting style or perceived competence were also identified in families receiving the intervention relative to wait-list controls. Reported effect sizes for significant effects were within the medium to large range (see Table 2), and 30 to 60 % of families demonstrated reliable behavior change across studies. Child and parenting outcomes were generally maintained for intervention families at follow-up 6-months or 1-year post-intervention. Parent satisfaction ratings of the intervention were high across studies. One study that directly compared SSTP-ST and SSTP-EN (Plant and Sanders 2007) found few significant differences in outcomes across the two interventions. However, study authors noted that families were not selected based on the presence of parental distress or relationship adjustment and may not have required supports in these areas.

Parents Plus—*Parents Plus* (Sharry et al. 1997; Sharry and Fitzpatrick 1998, 2001, 2007) is a set of group-based parenting interventions for parents of children ages 1 to 16. The intervention was designed to be a front-line intervention in Ireland that would be applicable to the majority of parents of children with conduct problems, including those with developmental disabilities. The original *Parents Plus Programme* (ages 4–11; Sharry and Fitzpatrick 1998) consisted of eight 2-hour group sessions that focused on positive parenting techniques (e.g., play and special time, encouragement and praise, attention) and behavior management strategies (e.g., rule setting, active ignoring, time out) that are similar to those presented in efficacious programs utilized in other countries (e.g., *Incredible Years*). Concepts were taught via videotaped modeling, discussion, and role-plays. *Parents Plus* broadly utilizes a cognitive behavioral approach in teaching parenting skills, and also emphasizes solution-focused approaches drawing on parents' strengths and expertise to develop effective behavior management strategies. *Parents Plus* currently incorporates three separate programs that are tailored to different age groups: Early Years Programme (ages 1 to 6; Sharry et al. 1997), Children's Programme (ages 6 to 11; Sharry and Fitzpatrick 2007), and Adolescent's Programme (ages 11 to 16; Sharry and Fitzpatrick 2001). All three programs are typically conducted in a group format focusing on age-appropriate parenting

skills. Individual parent practice and feedback sessions are also incorporated into the revised programs, especially the Early Years version. During individual sessions, parents are videotaped interacting with their child and therapists provide strength-based feedback to parents.

Three quasi-experimental, controlled studies have been conducted on versions of the *Parents Plus Programme* with young children with developmental disabilities (Coughlin et al. 2009; Griffin et al. 2010; Quinn et al. 2007). All three trials have been conducted by the same research group in Ireland. Trials have been conducted within community clinics and have employed few exclusionary criteria, allowing greater generalization to real-world settings. The majority of children with developmental disabilities in these studies were males. A study of the original *Parents Plus* program with parents of preschoolers (ages 4–7, $N=42$; Quinn et al. 2007) with developmental disabilities found a medium intervention effect on child behavioral problems relative to families in the wait-list control group ($d=0.49$), but no differences in family functioning, parenting stress, or social support. An evaluation of the *Parents Plus Early Years Programme* with preschoolers (ages 3 to 6, $N=117$; Griffin et al. 2010) exhibiting conduct problems found no differences in intervention effects for children with or without a developmental disability. Relative to a treatment-as-usual control group, families who received the intervention on average reported medium to large decreases in child behavioral difficulties ($d=0.52$) and hyperactivity ($d=0.72$). Parents also reported greater attainment of parent-defined goals ($d=1.39$) and fewer parenting problems ($d=0.97$). Effects were generally maintained at the 10-month follow-up for the intervention group. In contrast, a similarly designed evaluation of the *Parents Plus Children's Programme* ($N=99$; Coughlin et al. 2009) found that children with conduct problems only (ages 6 to 11) showed greater improvement following the intervention than did children with developmental disabilities and conduct problems, despite both groups having similar levels of behavioral problems at the beginning of the study. However, these findings should be interpreted with caution given the relatively small number of children with developmental disabilities in this study.

Parent Child Interaction Therapy—*Parent Child Interaction Therapy* (PCIT; Zisser and Eyberg 2010) is an empirically supported intervention for children ages 2 to 7 with significant behavior problems. PCIT is designed to change parent–child interactions and improve child behavior problems through two phases of treatment: 1) Child Directed Interaction (CDI) and 2) Parent Directed Interaction (PDI). During CDI parents receive in-vivo coaching through “bug-in-the-ear” microphone equipment during interactions with their child. Skills taught during this phase include praise, description, enthusiasm, and avoiding questions, commands, and criticism. During the PDI phase, parents are taught to use direct commands and follow through with appropriate disciplinary techniques. PCIT is typically delivered by a therapist in weekly individual sessions (typically 12, hour-long sessions) with the parent(s) and child.

Three RCTs have evaluated PCIT with children with specific developmental disabilities. The first study (Bagner and Eyberg 2007) utilized PCIT without any modifications with preschoolers (ages 3 to 6, $N=30$, mostly male) with mild to moderate mental retardation (children with ASD excluded) and co-morbid oppositional defiant disorder. High intervention fidelity was reported. Parents who completed the intervention displayed large intervention effects for observed CDI skills (“do skills” $d=2.06$, “don’t skills” $d=1.32$) and their children demonstrated greater compliance ($d=1.53$) than children in the wait-list control group. Based on parent-report, children in the PCIT group had fewer and less intense behavior problems ($d=0.66$ – 1.50). More conservative intent-to-treat analyses on weekly child behavior intensity ratings (parent-report, $d=0.67$) supported improvements in child behavior for the intervention group. No differences in parent stress levels were found. While

this study employed a strong design and measurement, findings should be interpreted cautiously given the high intervention drop-out rate (47 %) and the small sample size. The second study (Solomon et al. 2008) examined a slightly modified version of PCIT with boys (ages 5–12, $N=19$) with ASD and clinically significant behavior problems. Modifications included increased praise for child initiation of social interaction, as well as parental redirection or prohibition of isolative behaviors or mention of circumscribed interests. Although parents in the intervention group reported fewer distressing problem behaviors than wait-list control parents, no group differences were identified in behavior problem intensity over time. PCIT was associated with increased adaptability and decreased atypical behaviors for children who received the intervention. Significant increases in shared positive affect between parent and child were also observed for families in the PCIT group (not measured for controls). No change in parent stress levels were found for either group, despite clinically significant levels at baseline. The third study (Bertrand 2009) compared a group-based version of PCIT to a parent support and behavioral management (PSM) group for parents of children (ages 3–7, $N=46$) with FASD. An examination of weekly parent ratings of children's behavior revealed significant declines in behavior problems for both intervention groups, but no significant group differences. There was a non-significant trend for greater reductions in parenting stress for the PCIT group. None of the three studies evaluating PCIT included a follow-up assessment to examine persistence of intervention effects.

Other Parenting Programs—Several other programs were developed specifically for children with developmental disabilities and, to date, have only been evaluated in one study. Hudson and colleagues (2003) compared three delivery methods of the *Signposts for Building Better Behavior Programme* against a waitlist control group. The intervention was delivered to parents of children with intellectual disabilities ($N=115$) in one of the following three formats: 1) self-directed, 2) self-directed materials with telephone support by a therapist, and 3) in-person group delivery by a therapist. All three intervention groups received the same content on parenting skills and supporting materials (booklets, video, workbooks), which encouraged the use of functional behavioral assessment techniques to manage behavior. The authors reported they intended to evaluate the intervention formats relative to a control group using a RCT design, but some families allocated to the group intervention refused to travel to the site. These families were allowed to transfer into another condition, and several schools requested group delivery of the program at their sites. All measures were parent-report. Immediately post-intervention, mothers in the intervention conditions who completed the intervention reported less parenting stress ($d=.09$), higher parenting self-efficacy ($d=.06$), and a greater number of needs met ($d=.07$) than mothers in the wait-list control group (all medium effects). No differences were identified across intervention groups; however, sample sizes for the self-directed and telephone groups were very small due to semi-random assignment and high levels of attrition (range 43–72 % for all groups). No intervention effects were found for child behavior problems, although the authors note that the measure may not have been sensitive enough to detect effects.

Another study (Sofronoff and Farbotko 2002) also compared the efficacy of two delivery methods of a parent management training program for parents of children with Aspergers syndrome ($N=45$ couples). The intervention consisted of six content areas and was delivered in either a 1) one-day workshop or 2) 6 weekly hour-long individual sessions to parents. The content areas included psychoeducation on Aspergers syndrome, use of comic book conversations and social stories to teach children important skills, management of challenging behaviors (e.g., tantrums, anger, noncompliance), management of rigid behaviors associated with Aspergers syndrome, and management of anxiety. Compared to a wait-list control group, both intervention conditions resulted in fewer child behavior problems based on parent-report. The individual delivery format also resulted in greater

reduction in the intensity of behavior problems relative to both the workshop and the control groups. Effects were maintained at a 3-month follow-up assessment for the intervention groups.

A family behavior consultation program named *Families Moving Forward* (FMF) was developed and evaluated for families with children with FASD ($N=52$; Bertrand 2009). The 9-month (delivered every other week) intervention is based on social learning theory and uses a systematic, antecedent based approach to help families identify and manage their children's behavior problems. In this approach, families are taught how to observe and reframe their children's behaviors and subsequently create and advocate for appropriate accommodations (modifications to the physical or caregiving environment). Therapists also provide advocacy assistance and work with parents to identify appropriate social supports and self-care. Retention and intervention fidelity were high in the reported RCT. All measures were parent-report. Immediately post-intervention, families who participated in FMF reported greater parenting self-efficacy, greater use of self-care strategies, a greater number of parental needs met, and a decrease in child behavior problems relative to families receiving community treatment as usual. No differences in parenting stress were identified across groups. No follow-up studies have been published to date.

School Based Interventions

The majority of school-based preventive interventions have been delivered in general education classrooms. When children with developmental disabilities are included in these interventions, studies rarely examine outcomes separately for this group. Curricula targeting emotional and behavioral functioning have not generally been evaluated in rigorous controlled designs in special education classrooms serving children with developmental disabilities. The *Promoting Alternative Thinking Strategies* (PATHS) curriculum is the primary exception.

Promoting Alternative Thinking Strategies—*Promoting Alternative Thinking Strategies* (PATHS) is a universal school-based preventive intervention curriculum aimed at reducing aggression and behavior problems in children by promoting socioemotional competence in the early elementary school years (Kusche and Greenberg 1994). The PATHS curriculum is delivered by classroom teachers two to three times per week and generalization of lessons across the school-day is emphasized. The curriculum is based on the ABCD (affective-behavioral-cognitive-dynamic; Greenberg et al. 1998) model of development. Lessons focus on behavioral self-control skills, affective awareness and communication skills, and interpersonal problem solving. Lessons are sequenced according to increasing developmental difficulty and include didactic instruction, role-play, class discussion, modeling by teachers and peers, and worksheets. The efficacy of the PATHS curriculum has been demonstrated in a number of studies and it was selected as one of the 10 *Blueprint for Violence Prevention Programs* (Greenberg et al. 1998).

PATHS has also been evaluated as a selected/indicated prevention program for children in self-contained special education classrooms (Greenberg et al. 1995; Kam et al. 2004). In this longitudinal evaluation, self-contained special education classrooms (mixed grades 1st–3rd) were randomized to receive the PATHS intervention or classroom instruction as usual. Special education teachers used a modified version of PATHS that placed greater emphasis on teaching and reinforcing behavioral self-control and less emphasis on more advanced steps of problem solving. Immediately following the intervention, children in special education classrooms who received PATHS ($N=47$) were better able to generate feeling words and give examples of basic feelings, had a better understanding that people can hide, manage, and change feelings, and were better able to understand cues for recognizing

feelings in others, relative to children in control special education classrooms ($N=47$). Intervention effects did not differ across special education categories (i.e., mild mental retardation, learning disabilities, severe emotionally and behaviorally disturbed; Greenberg et al. 1995). A long-term follow-up of children in special education classrooms in this study identified significant intervention effects in emotional and behavioral functioning up to 2 years post-intervention (Kam et al. 2004). Specifically, the intervention reduced the rate of growth in teacher reported externalizing and internalizing behavior problems and produced a sustained reduction in children's self-reported depression symptoms. At the 2-year follow-up assessment, children who had received PATHS also had a greater affective vocabulary and tended to give fewer aggressive and more non-confrontational solutions to solving interpersonal problems.

Multiple Component Interventions

Despite the large number of risk factors many families of children with developmental disabilities face, only one intervention was identified that incorporated multiple components. Chadwick and colleagues (2001) evaluated a brief intervention program for children with severe developmental disabilities ($N=106$) that included six sessions of parent training and two-day workshops for teachers. Intervention objectives included improving parent understanding of the causes of challenging behavior, introducing behavioral analysis techniques, modeling strategies of how to teach appropriate behaviors, training in creating behavior plans, and identifying obstacles in implementing behavior plans. The delivery method of parent training was directly examined; parents were randomized to either receive individual or group training. Results indicated that individual parent delivery was associated with greater reductions in behavior problem severity relative to both the group delivery and wait-list control groups immediately post-intervention. No differences in the frequency of behavior problems or parenting stress were identified. However, findings from this study should be interpreted cautiously given relatively low levels of program uptake (e.g., only 33 % of families began group condition) and difficulties with program implementation (e.g., only 63 % of children's teachers received the workshops). The teacher and parent components also did not appear to be well integrated.

Discussion

The purpose of the current review was to identify and evaluate the efficacy of interventions targeting the prevention and treatment of behavioral problems in young children with developmental disabilities. Findings will be evaluated for child and parent outcomes separately, followed by a discussion of research challenges in the field and recommendations for future investigation.

Child Outcomes

Nearly all studies selected for inclusion in this review demonstrated some positive intervention effects for children with developmental disabilities and/or their families. All studies examined child behavioral problems as a primary outcome. Eighty-eight percent of studies (15/17) identified greater improvement in children's behavior or emotional functioning post-intervention relative to a comparison group and significant effect sizes were generally within the medium to large range. Of the two studies that did not find an effect for child behavior, one compared two active interventions (Bertrand 2009) and the second utilized a brief measure of child behavior that consisted of items that were not likely sensitive to change (e.g., "My child cannot walk, or walk well"; Hudson et al. 2003). The 15 studies that included a parent training component all utilized parent-report measures of child behavior. Three of these studies also included an observational measure of parent-child interaction and all three found significant improvements in child behavior (Bagner and

Eyberg 2007; Plant and Sanders 2007; Roberts et al. 2006), which strengthens parent-reported findings.

Eleven studies included follow-up evaluations ranging from 3-months to 2 years post-intervention (median follow-up was 6-months post-intervention); however, nine of these studies utilized a wait-list control group design and were only able to assess families in the intervention group at follow-up. Across studies, intervention effects were generally maintained at follow-up assessments. Findings were mixed for the two studies that were able to assess children in both the intervention and control groups at follow-up (Chadwick et al. 2001; Kam et al. 2004). Specifically, children who received PATHS in special education classrooms demonstrated continued improvement over the 2-year follow-up period relative to controls (Kam et al. 2004), whereas intervention effects were not maintained over a six-month period for the brief individual intervention provided by Chadwick and colleagues (2001). However, it should be noted that this latter study was relatively brief and had difficulties with program uptake and implementation.

The majority of studies focused on externalizing behavioral problems. However, two studies also found positive intervention effects for internalizing behavior (Greenberg et al. 1995; Kam et al. 2004; McIntyre 2008a). It should be noted that both of these studies would be classified as selected interventions, as they included children with and without existing behavior problems. Future studies should include measures of both internalizing and externalizing behavior in the evaluation of preventive interventions.

Studies varied in terms of children's developmental disabilities. Ten studies included children with developmental disabilities of mixed etiologies (both known and unknown), with the majority in the mild to moderate range. Two studies directly examined group differences in outcomes based on children's identified disability; no differences in child behavior were identified by type of developmental disability in either study (Greenberg et al. 1995; McIntyre 2008a). Although these findings should be considered preliminary given the small number of studies analyzing type of disability, they suggest that preventive interventions may be applicable for children across a range of developmental disabilities. Other studies included in this review focused on evaluating interventions for children with specific disabilities, including autism spectrum (3), intellectual disabilities (3), and fetal alcohol spectrum disorders (2). All three studies that examined interventions specifically with children with autism spectrum disorders (i.e., Sofronoff and Farbotko 2002; Solomon et al. 2008; Whittingham et al. 2009) found significant improvements on the same measure of child behavior (Eyberg Child Behavior Inventory, Problem Scale). Results from studies targeting children with intellectual disabilities were more varied (i.e., Bagner and Eyberg 2007; Chadwick et al. 2001; Hudson et al. 2003), which is not surprising given the wide differences in the nature of the samples (e.g., severity of intellectual disability, whether excluded autism), length of intervention, mode of delivery, and program uptake across studies. Finally, the majority of studies reviewed included a higher proportion of families with male children. This finding is not surprising, given the unequal prevalence rates by gender for some developmental disabilities (e.g., autism) and tendencies for boys to display higher rates of externalizing problems than girls.

Parent Outcomes

As stated earlier, parent training has been the most widely studied type of intervention for children with developmental disabilities. Programs included in this review generally follow one of two approaches to parent training. In one approach, parents are taught discrete skills to promote child development (e.g., attention, child-directed play, providing engaging activities, praise) and manage challenging behavior (e.g., rule setting, giving clear instructions, planned ignoring, rewards, time out). Programs utilizing this approach include

Incredible Years, *Stepping Stones Triple P*, *Parents Plus*, and *Parent Child Interaction Therapy*, and have generally evolved from programs developed for parents of typically developing children. Although teaching strategies vary, most interventions include didactic instruction, video or in-vivo modeling, and opportunities for practice (either in session or through homework) and feedback. The second approach to parent training involves teaching parents functional behavioral assessment strategies, which include observing their child's behavior and developing behavior plans based on the function of the behavior. Programs using this latter approach include *Signposts* (Hudson et al. 2003), *Families Moving Forward* (Bertrand 2009), and the brief intervention described by Chadwick and colleagues (2001). These programs were developed specifically for children with developmental disabilities rather than adapting existing programs for typically developing children.

Of the 14 studies that evaluated parenting interventions, half assessed changes in parenting behavior either through parent report and/or observation. Six of the seven studies reported medium to large intervention effects on self-reported (Roberts et al. 2006; Sofronoff, et al. 2011; Whittingham et al. 2009) or observed (Bagner and Eyberg 2007; Griffin et al. 2010; McIntyre 2008a; Roberts et al. 2006) parenting behavior. Plant and Sanders (2007) found improvements in self-reported parenting only for the standard version of SSTSP (not enhanced) and did not detect any intervention effects for observed parent behavior.

In contrast, very few studies (2/13, 15 %) found significant decreases in parenting stress post-intervention. One possibility for the lack of intervention effects for parent stress in some studies is that pre-intervention stress levels were already within the normative range. This finding is somewhat surprising given numerous studies in the literature that show high levels of parental stress in families of children with developmental disabilities (e.g., Baker et al. 2003; Saloviita et al. 2003). However, stress levels were relatively high in other studies and did not respond to intervention, suggesting that the parenting interventions evaluated may not be effective in reducing parental stress for families of children with developmental disabilities. Interestingly, a recent meta-analysis (Singer et al. 2007) found that behavioral parent training interventions alone or cognitive behavioral parent stress management training interventions alone each produced small effects on stress and adjustment levels for parents with children with developmental disabilities. In contrast, multi-component interventions that included both parent training and stress management components resulted in large effects for parents. In light of these findings, it is not surprising significant effects were not often found in the majority of studies reviewed herein since they involved a single component behavioral training intervention and had small sample sizes.

Several studies of parenting interventions directly compared intervention delivery methods. Preliminary evidence suggests that individual delivery methods may have an advantage over group delivery for parents of children with developmental disabilities (Chadwick et al. 2001; Sofronoff and Farbotko 2002), which is consistent with meta-analyses of parenting interventions (Lundahl et al. 2006a; b). However, both of these interventions were relatively brief with a maximum of six sessions. It is possible that group-based interventions would produce equal or superior results relative to individual delivery with more intensive interventions for families of children with developmental disabilities, as many of these families experience social isolation (e.g., Embregts et al. 2010). More direct comparisons of delivery methods would help clarify this hypothesis.

Challenges of Evaluating Interventions for Children with Developmental Disabilities

Conducting controlled trials with children with developmental disabilities and their families can be particularly challenging for a number of reasons. One substantial challenge is the difficulty of identifying and recruiting large samples of children with developmental disabilities and their families. The sample size of treatment groups of studies reviewed

ranged from 10 to 48, with most falling between 20 and 30 children per group. Smaller samples limit the ability to detect effects and can result in discrepant findings across studies. Attrition is a major challenge for controlled trials in general, and can be particularly salient for families with children with developmental disabilities. Families of children with developmental disabilities often face high levels of stress and have a large caregiving burden depending on the nature of their child's disability (Baker et al. 2003; Saloviita et al. 2003). Completing intensive programs can be difficult for these families due to time, financial, transportation, childcare, and other constraints. Although many of the studies reviewed have pre/post attrition rates (median=25 %, range 0–54 %) within the range often encountered in psychotherapy with children in general (40–60 %; Kazdin 1996), attrition limits the strength and generalizability of findings. Incorporating methods to reduce attrition may be particularly important for this population (e.g., flexible meeting times, providing childcare or transportation). The nature of children's developmental disabilities is also an important factor in terms of generalizability. As discussed above, children's disabilities varied across studies, with some focusing on specific subgroups (e.g., autism spectrum, FASD, intellectual disabilities) and others including more heterogeneous samples. It is important for researchers to keep these challenges in mind when designing and implementing efficacy trials.

Recommendations for Future Investigation

Although significant progress has been made over the last decade in evaluating interventions for the prevention and treatment of behavioral problems in young children with developmental disabilities, the evidence base remains limited for this population. More research is needed to replicate findings for existing interventions as well as develop new innovative programs. When multiple trials of an intervention for children with developmental disabilities have been conducted, they have generally been completed by the same research group (with the exception of PCIT). Independent replications are needed to establish efficacy and reduce bias.

Much work remains to elucidate the dynamic processes that impact the development of behavioral problems in children with disabilities, as well as those factors that influence which children and families are most likely to respond to intervention. Longitudinal, prospective studies incorporating multi-method assessment would be particularly useful in identifying risk and protective factors and their complex influences on development in this population (Rutter and Sroufe 2000). Furthermore, research on influences that deflect children on multiple developmental pathways could aid in understanding the heterogeneity of outcomes in this population (i.e., equifinality, multifinality; Cicchetti and Rogosch 1996). Preventive intervention efficacy trials can also provide critical insights into existing theories on the development of behavioral problems in children (Cicchetti and Toth 2009; Coie et al. 1993). Interventions that alter the course of development and reduce the risk for negative outcomes can advance our knowledge on processes involved in the etiology and malleability of behavioral problems. Additional studies examining the characteristics of individuals who benefit most from interventions will inform policy and service delivery decisions and improve cost-effectiveness.

Another area for future research is the development and evaluation of more comprehensive preventive interventions for young children with developmental disabilities and their families. The majority of existing interventions for families of children with developmental disabilities consist of a single component. Although these interventions demonstrated positive intervention effects, multi-component, comprehensive interventions may have greater efficacy in preventing mental health and behavior disorders in this population (Coie et al. 1993; Nation et al. 2003). As mentioned above, comprehensive programs may also

yield greater benefits for parent distress or other family adjustment problems (Gavidia-Payne and Hudson 2002; Singer et al. 2007).

A greater emphasis on the prevention of behavioral problems in young children with developmental disabilities prior to the onset of significant symptoms or clinical disorders is also greatly needed. Research in the general population with some of the same programs reviewed herein are effective as selective preventive interventions for children who do not yet evidence signs or symptoms of mental health or behavioral disorders (e.g., Mazzucchelli and Sanders 2011; McIntyre and Phaneuf 2007). Initial studies utilizing *The Incredible Years* (McIntyre 2008a) or the PATHS curriculum (Greenberg et al. 1995; Kam et al. 2004) suggest children with developmental disabilities without clinically significant behavior problems can benefit from these interventions.

The design of follow-up assessments is also important when planning a preventive intervention trial. Most studies in the current review utilized a wait-list control group and were unable to evaluate longer-term effects of the intervention. Depending on the natural course of the disorder or problem that is the target of prevention, follow-up evaluations will need to be conducted that span the typical developmental period of the target behavior to assess for short- and long-term prevention effects. Having an appropriately selected control group that does not receive the intervention but participates in all follow-up evaluations is critical for this type of evaluation. Without this comparison group, it is difficult to determine if the intervention had an effect over time (i.e., no change in the intervention group vs. increase in symptoms in the control group; both groups have similar decrease/increase in symptoms).

Finally, much work is needed to increase the dissemination of effective interventions for children with developmental disabilities. This statement is true for interventions in general and considerable efforts are being made to impact training and policies in community settings (Kendall and Beidas 2007; Stirman et al. 2004; Toth et al. 2011). Continued development of innovative delivery practices will facilitate dissemination. For example, McIntyre and Phaneuf (2007, 2011) developed and have preliminary data supporting a three-tier system for intervention delivery within the context of an early childhood education program. This approach increases access to services, utilizes screening and evaluation processes in a setting familiar to families, and uses a stepped-approach to intervention delivery to best match each family's intervention needs. Identifying families in primary or specialty care or school settings may also provide opportunities to engage families and increase access to services.

The use and/or adaptation of existing interventions developed for the general population may also aid in dissemination and access to evidence based interventions for children with developmental disabilities because a wider network of providers will be available to implement these interventions. Results from the *Parents Plus* and PATHS programs support broadly offering programs for children with or without developmental disabilities (Greenberg et al. 1995; Griffin et al. 2010; Quinn et al. 2006). Furthermore, adaptations of existing parenting interventions with strong evidence for effectiveness in the general population (i.e., *Incredible Years*, *Triple P*, *Parent-child Interaction Therapy*) appear to produce positive intervention effects and are acceptable to families of children with developmental disabilities.

Conclusions

In summary, young children with developmental disabilities and their families can benefit from interventions designed to prevent or treat behavioral problems. The majority of

reviewed studies focused on treating existing behavioral problems and would be designated as indicated in this review. Many of the programs evaluated were initially developed for typically developing children with conduct problems. Considerable evidence has accumulated that demonstrates their efficacy in both the prevention and treatment of a variety of child and family outcomes (National Research Council and Institute of Medicine 2009). It is likely that similar programs could be effective as selected or indicated preventive interventions for children with developmental disabilities. Further research is needed in developing and evaluating preventive interventions for children with developmental disabilities. Greater attention to identifying the dynamic processes influencing the onset and course of behavioral problems would greatly strengthen our knowledge and ability to design effective interventions for this population. Continued development of innovative delivery approaches and wider dissemination is also needed.

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Table 1

Terms utilized in literature searches

Developmental disability	Behavior	Intervention
Developmental disability [*]	Behavior [*]	Intervention
Intellectual disability [*]	Behavior problem [*]	Program [*]
Developmental disorder [*]		Curriculum [*]
Mental retardation		Training
Special education		Randomized controlled trial
Pervasive developmental disability [*]		Randomized trial
		Clinical trial
		Clinical evaluation

Note:

^{*} is used in searches to pull up the same term with different endings

Table 2

Summary of studies included in the review

PROGRAM Study	Design, total and group sample sizes, % total attrition	Child characteristics: age, DD, behavior criteria for inclusion	Intervention delivery	Intervention effects for child behavior (effect sizes when reported)	Intervention effects for parenting and parent stress (effect sizes when reported)	Follow-up, attrition from original sample
Parenting approaches						
Incredible Years						
McIntyre 2008a	RCT N=49 IYPT-DD=24 WLC=25 11 %	<ul style="list-style-type: none"> ages 2-5 DD mixed etiology (39 % autism) no behavioral criteria for inclusion 	<ul style="list-style-type: none"> IYPT Toddler program with DD adaptations 12 weekly 2.5 h group sessions 8-12 parents per group 	<ul style="list-style-type: none"> decreased parent-report total ($d=.11$) and internalizing ($d=.12$) behavior problems No differences on externalizing problems ($d=.06$) No difference by DD diagnosis (autism vs. other) 	<ul style="list-style-type: none"> decrease in observed inappropriate/negative parenting ($d=.37$) No differences in parental report of stress 	n/a
Stepping Stones Triple P						
Roberts et al. 2006	RCT N=47 SSTP=24 WLC=23 33 %	<ul style="list-style-type: none"> ages 2-7 DD mixed etiology most mild severity existing behavior problems 	<ul style="list-style-type: none"> 10 individual sessions didactic 2 h clinic sessions and 1 h home visits optional enhanced modules as needed 	<ul style="list-style-type: none"> fewer maternal-report behavioral problems ($d=.22$) observed decreases in oppositional behavior - target setting ($d=.23$) observed decreases in noncompliance - generalized setting ($d=.21$) 	<ul style="list-style-type: none"> less maternal reported overreactivity ($d=.29$) less paternal laxness ($d=.34$) and verbosity ($d=.50$) observed increase in parental praise ($d=.22$) No differences in parental report of stress 	<ul style="list-style-type: none"> SSTP only 44 % maintained at 6-month

PROGRAM Study	Design, total and group sample sizes, % total attrition	Child characteristics: age, DD, behavior criteria for inclusion	Intervention delivery	Intervention effects for child behavior (effect sizes when reported)	Intervention effects for parenting and parent stress (effect sizes when reported)	Follow-up, attrition from original sample
Plant and Sanders 2007	RCT N=74 SSTP-S=26 SSTP-E=24 WLC=24 0 %	<ul style="list-style-type: none"> • age <6 • DD mixed etiology • clinically elevated score on measure of behavioral problems 	<ul style="list-style-type: none"> • weekly individual sessions (60–90 min) • SSTP-S: 10 sessions • SSTP-E: 16 sessions 	<ul style="list-style-type: none"> • SSTP-S decrease in overall disruptive behavior • SSTP-E decrease in difficult child behavior • both SSTP-S and -E equally decreased observed negative child behavior 	<ul style="list-style-type: none"> • SSTP-S and -E increased parental perceived competence • SSTP-S increased perceived parenting skills • No group differences for observed negative parenting • No differences in parental report of stress 	<ul style="list-style-type: none"> • SSTP only • 10 % • maintained at 1-year
Whittingham et al. 2009	RCT N=59 SSTP=29 WLC=30 5 %	<ul style="list-style-type: none"> • ages 2–9 • autism spectrum disorder • parent-identified existing behavioral problems 	<ul style="list-style-type: none"> • 9 sessions • group didactic sessions and individual practice/feedback sessions • social stories 	<ul style="list-style-type: none"> • decreased parent-reported frequency ($\bar{z}=1.6$) and intensity ($\bar{z}=2.6$) of behavior problems 	<ul style="list-style-type: none"> • decreased parent-report of laxness ($\bar{z}=2.2$), overreactivity ($\bar{z}=2.5$), and verbosity ($\bar{z}=1.6$) 	<ul style="list-style-type: none"> • SSTP only • 10 % • maintained at 6-month
Sofronoff et al. 2011	RCT N=70 SSTP=35 WLC=35 33 %	<ul style="list-style-type: none"> • age mean=6.15 • DD mixed etiology • no behavioral criteria for inclusion 	<ul style="list-style-type: none"> • two 90-minute seminars 	<ul style="list-style-type: none"> • decreased frequency of parent-reported behavior problems ($d=0.35$) • No differences in severity of behavior problems. 	<ul style="list-style-type: none"> • decreased parent-report of overreactivity ($d=0.54$) and verbosity ($d=0.49$) • No differences in parental report of stress 	<ul style="list-style-type: none"> • SSTP only • 37 % • maintained at 3-month

Parents Plus

PROGRAM Study	Design, total and group sample sizes, % total attrition	Child characteristics: age, DD, behavior criteria for inclusion	Intervention delivery	Intervention effects for child behavior (effect sizes when reported)	Intervention effects for parenting and parent stress (effect sizes when reported)	Follow-up, attrition from original sample
Quinn et al. 2007	QEC N=42 PP=23 WLC=19 2 %	<ul style="list-style-type: none"> ages 4–7 most mild-moderate intellectual disability some autism spectrum clinically significant behavioral problems 	six 2-hour group sessions	decrease in parent-reported total difficulties ($d=0.49$)	No differences in parental report of stress	<ul style="list-style-type: none"> PP only 13 % maintained at 10-month
Griffin et al. 2010	QEC N=117 PPEY=65 WLC=52 31 %	<ul style="list-style-type: none"> ages 3–6 76 DD +behavior problems, 41 behavior problems only all children existing behavior problems 	seven 2-hour group sessions and 5 individual sessions	<ul style="list-style-type: none"> decrease in parent-reported total difficulties ($d=0.52$) and hyperactivity ($d=0.72$) No differences in intervention effects for children with or without a DD 	No differences in parental report of stress	<ul style="list-style-type: none"> PPEY only 46 % maintained at 5-month
Coughlin et al. 2009	QEC N=99 PPCP=58 WLC=41 25 %	<ul style="list-style-type: none"> ages 6–11 24 DD +behavior problems, 50 behavior problems only all children existing behavior problems 	nine 2-hour group sessions and 2 individual sessions	<ul style="list-style-type: none"> decrease in parent-reported total difficulties ($d=0.57$) and conduct problems ($d=0.81$) Children without DD greater decrease in behavior problems than children with DD 	Significant decrease in parent stress ($d=0.11$)	<ul style="list-style-type: none"> PPCP only 53 % maintained at 5-month
Parent–child Interaction Therapy						
Bagner and Eyberg 2007	RCT N=30 PCIT=15 WLC=15 27 %	<ul style="list-style-type: none"> ages 3–6 mild-moderate mental retardation 	<ul style="list-style-type: none"> twelve 1-hour weekly individual sessions no modifications to standard PCIT 	decrease in parent-reported child behavior problems ($d=0.97-1.08$)	<ul style="list-style-type: none"> greater observed CDI “do skills” ($d=2.06$), and fewer “don’t skills” ($d=1.32$) 	n/a

PROGRAM Study	Design, total and group sample sizes, % total attrition	Child characteristics: age, DD, behavior criteria for inclusion	Intervention delivery	Intervention effects for child behavior (effect sizes when reported)	Intervention effects for parenting and parent stress (effect sizes when reported)	Follow-up, attrition from original sample
Solomon et al. 2008	RCT N=19 PCIT=10 WLC=9 0 %	<ul style="list-style-type: none"> • meet clinical criteria for ODD • ages 5–12 • boys with autism spectrum disorders • clinically significant elevation on measure of behavior problems 	<ul style="list-style-type: none"> • twelve 1-hour weekly individual sessions • modifications to address focused interests, child isolation, and limited child social initiation 	<ul style="list-style-type: none"> • decrease in intensity of problems ($d=1.50$) • greater observed child compliance ($d=1.53$) • decrease in parent-reported total behavior problems and atypicality • increase in adaptability • No differences in behavioral intensity 	<ul style="list-style-type: none"> • No differences in parental report of stress • increased observed parent positive affect and shared parent–child positive affect • No differences in parental report of stress 	n/a
Bertrand 2009	RCT N=46 PCIT=23 PSM=23 54 %	<ul style="list-style-type: none"> • ages 3–7 • fetal alcohol spectrum disorders • no behavioral criteria for inclusion 	<ul style="list-style-type: none"> • Group-based PCIT vs. Parent Support Management group • both met weekly 90-minute sessions • PCIT parent–child, PSM parent only 	Both groups significant decrease in child behavior problems across weekly ratings, but no group differences	No significant difference in parent report of stress, but trend for PCIT to have greater reduction	n/a
Other						
Hudson et al. 2003	QEC N=115 Group=46 Phone=13 Self=29 WLC=27 43 %	<ul style="list-style-type: none"> • ages 4–19 • mild-moderate intellectual disability mixed etiology • no behavioral criteria for inclusion 	<ul style="list-style-type: none"> • Signposts for Building Better Behavior Programme • Delivery varied: Group - six 2-hour sessions bimonthly; Phone - bimonthly materials send and check-in calls; 	No differences in child behavior problems	Mothers of all 3 intervention groups reported decrease in stress ($\eta^2=.09$), more able to manage role as parent ($\eta^2=.06$), and needs being met ($\eta^2=.07$)	<ul style="list-style-type: none"> • Intervention groups only • 72 % • maintained at 6-month

PROGRAM Study	Design, total and group sample sizes, % total attrition	Child characteristics: age, DD, behavior criteria for inclusion	Intervention delivery	Intervention effects for child behavior (effect sizes when reported)	Intervention effects for parenting and parent stress (effect sizes when reported)	Follow-up, attrition from original sample
Self - bimonthly materials sent.						
Sofronoff and Farbotko 2002	RCT N=45 couples Group=17 Indiv=18 WLC=10 no attrition data	<ul style="list-style-type: none"> ages 6-12 Asperger syndrome no behavioral criteria for inclusion 	<ul style="list-style-type: none"> 6 components delivered group workshop format all in 1 day; individual six weekly 1-hour sessions in clinic 	<ul style="list-style-type: none"> both intervention groups decrease in frequency and severity of parent-reported behavior problems individual greater decrease in severity of behavior problems 	n/a	<ul style="list-style-type: none"> Intervention only maintained at 3-month
Bertrand 2009	RCT N=52 FMF=26 TAU=26 0 %	<ul style="list-style-type: none"> ages 5-11 fetal alcohol spectrum disorders externalizing or attention problems 	<ul style="list-style-type: none"> Families Moving Forward Program. sixteen 90-minute sessions every other week, in-home advocacy assistance 	decrease in parent-reported behavior problems	No differences in parental report of stress	n/a
School-based approaches						
PATHS						
Greenberg et al. 1995	RCT N=286 GeEd=192 PATHS=83 CON=109 SpEd=94 PATHS=47 CON=47 no attrition data	<ul style="list-style-type: none"> ages 6-11 general and special education students SpEd: 44 LD, 23 mental retardation, 22 EBD, 5 multi-problem No behavioral criteria for inclusion 	<ul style="list-style-type: none"> pilot version of PATHS 60 sessions delivered by teachers in classrooms 2-3 times a week for 20-30 min 	<ul style="list-style-type: none"> improved emotional understanding and communication skills No differences in intervention effects across special education categories 	n/a	n/a

PROGRAM Study	Design, total and group sample sizes, % total attrition	Child characteristics: age, DD, behavior criteria for inclusion	Intervention delivery	Intervention effects for child behavior (effect sizes when reported)	Intervention effects for parenting and parent stress (effect sizes when reported)	Follow-up, attrition from original sample
Kam et al. 2004	RCT N=133	<ul style="list-style-type: none"> ages 6–11 special education students No behavioral criteria for inclusion 	<ul style="list-style-type: none"> pilot version of PATHS 60 sessions delivered by teachers in classrooms 2–3 times a week for 20–30 min 	<ul style="list-style-type: none"> decrease in teacher-reported externalizing and less increase in internalizing Greater decline in self-reported depression symptoms Greater affective vocabulary (d=0.54) 	n/a	Analyses include baseline, post-intervention, and 1- and 2-year follow-up assessments for both groups
Multi-component approaches						
Chadwick et al. 2001	QEC N=106 Indiv=30 Group=48 CON=28 42 %	<ul style="list-style-type: none"> ages 4–11 severe DD with mixed etiology existing behavioral problems 	<ul style="list-style-type: none"> Individual: 5–7 in-home sessions every 2 weeks. Group: five weekly 1.5–2 h sessions Teachers 2 day workshops 	<ul style="list-style-type: none"> Individual greater improvement in parent-reported severity of behavior problems no differences in frequency of behavior 	<ul style="list-style-type: none"> No differences in parent report of stress 	<ul style="list-style-type: none"> All groups included in 6- month follow-up 54 % not maintained

Effect sizes reported: $2 = \eta^2$ squared, .01 is a small effect, .06 is a medium effect, and .14 is a large effect; $d = \text{Cohen's } d$, 0.2 is a small effect, 0.5 is a medium effect, and 0.8 is a large effect

RCT randomized controlled trial; QEC quasi-experimental controlled trial; WLC wait-list control; TAU treatment as usual; CON control group; IYPT-DD Incredible Years Parent-Training-Developmental Disabilities; SSTP Stepping Stones Triple P; SSTP-S SSTP-Standard; SSTP-ESSTP-Enhanced; PP Parents Plus; PPEY Parents Plus Early Years; PPCPP Parents Plus Child Programme; PCIT Parent-child Interaction Therapy; PSM Parent Support Management group; Indiv Individual; FMF Families Moving Forward; GeEd general education; SpEd Special education; LD learning disabilities; EBD emotionally and behaviorally disturbed; PATHS Promoting Alternative Thinking Strategies; DD developmental disabilities