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INTELLECTUAL DISABILITY (R CONDILLAC AND P BURNHAM RIOSA, SECTION EDITORS)

Early Behavioral Intervention for Young Children with Intellectual and Developmental Disabilities

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Abstract

Purpose of Review Early intervention can enhance the development of young children with IDD by altering the developmental trajectory and preventing further delay. This review summarizes the approach and findings of studies on early behavioral interventions specific to young children (< 5) with intellectual and developmental disabilities (IDD) excluding autism spectrum disorders (ASD).

Recent Findings There is support for the efficacy of focused and comprehensive behavioral interventions as well as milieu communication training and behavioral parent training for addressing the needs of young children with IDD. New research explores interventions tailored to the needs of specific subgroups of children with IDD and how learner characteristics and intensity moderate outcomes.

Summary Most research does not consider the needs of subgroups of IDD aside from ASD. Future work needs to include high-quality evaluation studies and to further evaluate tailored intervention approaches that address the specific needs of subgroups of children with IDD.

Keywords Behavioral intervention · Intellectual disabilities · Developmental disabilities · Applied behavior analysis

Introduction

Intellectual and developmental disabilities (IDD) are a cluster of categories characterized by lifelong limitations in general mental abilities and adaptive functioning that manifest before 18 years of age [1]. The term IDD represents a larger category that encompasses intellectual disabilities, developmental disabilities, and a co-occurrence of both [2]. Although the broad category of IDD includes persons with autism spectrum disorder (ASD), for the purposes of this review, we will use the term IDD to refer to intellectual and developmental disabilities excluding those with a primary diagnosis of ASD.

Globally, the prevalence of IDD ranges from 0.05 to 1.55% [3]. IDD is associated with impairments in language, social, conceptual, and practical skills that vary in severity across domain and over the lifespan [4]. Children with IDD and their families represent a vulnerable population that face additional challenges such as increases in parental stress [5], social stigma [6], and behavioral problems [7]. Previous research suggests that without intervention, these challenges may persist into adulthood [8]. Early intervention can enhance the development of young children with IDD by altering developmental trajectories and by preventing cascading challenges from occurring [9]. Because many IDDs are diagnosed early in life, prenatally, or at birth, there is a wide, optimal window for the provision of early intervention.

Behavioral interventions are based on the science of applied behavior analysis (ABA). They share the assumption that behavior is learned and maintained by its antecedents and consequences (i.e., observable environmental events). ABA is applied; it is used to address behavior of social importance. The manipulation of antecedent variables (e.g., establishing operations, discriminative stimuli) and the systematic application of consequences are used to develop new skills and a repertoire that minimizes challenging behavior [10]. The use of ongoing data collection and analysis to monitor effectiveness is a hallmark component of ABA [10]. ABA interventions are highly individualized, contributing to their efficacy at teaching skills across multiple domains.

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Although the use of ABA has grown in application to various populations as well as multiple different intervention models, it has remained somewhat limited in the application to a variety of IDDs. Currently, ABA interventions are widely utilized in special education settings [11], with young children with ASD [12, 13], and in treating challenging behavior [14] but are not yet widely used for early intervention for children with IDD who do not have ASD. Much of the research on early behavioral intervention has focused on young children with ASD, leading to well-established treatment considerations for this population [12, 13]. Comparatively, there has not been a significant amount of rigorous research on early behavioral interventions that address the needs of young children with IDD without ASD. For ABA to become widely applied to young individuals with IDD, it is critical to demonstrate efficacy within this population. Examination of the potential benefits of these interventions for children with IDD will serve to inform research and practice in this area. Therefore, the purpose of this selective review is to summarize and discuss recent research involving early behavioral intervention for children (> 5 years) with IDD without ASD.

Specificity and Behavioral Phenotypes

Designing effective interventions for young children with IDD is complicated by the large amount of heterogeneity within the category, including the cause of the diagnosis (e.g. genetic, neurophysiological, and environmental factors) as well as developmental and behavioral patterns [9, 15]. As a result, it is not surprising that there is extensive variability in the response to intervention for this population. To produce a better match between the intervention strategies and the needs of children with IDD and their families, some researchers have begun designing interventions for subgroups of children with IDD.

These subgroups are based on the children's characteristics and include diagnostic subgroups (e.g., ASD) and etiologic subgroups (e.g., Down syndrome [DS] and fragile X syndrome). Combining work on genetic and neurological causes of disability with a behavioral understanding of behavior problems [15] has resulted in the idea that certain genetic causes of IDD are associated with a behavioral profile, termed the behavioral phenotype [16, 17]. Behavioral phenotypes are often described as areas of strengths and weaknesses across domains of functioning. For example, children with Fragile X syndrome show higher rates of self-injurious behavior, social anxiety, and gaze avoidance than children with developmental disabilities in general [18, 19]. In contrast, children with DS have a lower rate of comorbid psychopathology relative to children with undifferentiated developmental delays [20]. Behavioral researchers have conceptualized the behavioral phenotype as a biological setting event that functions as a motivating operation to change the value of certain consequences and behavior associated with those consequences [21•]. For example, the reinforcing effectiveness of social attention may be higher for children with Down syndrome who often seek social interaction, yet permanently lower in children with ASD who may avoid social interaction. Therefore, behavior which results in social interaction may occur at higher rates for children with Down syndrome, but at lower rates for children with ASD. Researchers and practitioners might capitalize on this knowledge by pairing highly valued social interaction with less valuable object-related consequences among children with Down syndrome, similar to how tangible or object-related consequences are paired with social interaction to increase their value during intervention programs for children with ASD.

Several researchers [22–24] have suggested that information on behavioral phenotypes could guide the development of interventions targeting the critical weaknesses of individuals with a common genetic syndrome; yet, few have explored this in practice [25]. As knowledge of the characteristics of ASD has increased, it has successfully been translated into effective early intensive behavioral interventions (EIBI) and focused behavioral interventions targeting critical areas of need [26]. Similar positive outcomes may be possible if interventions are tailored to meet the needs of various IDD etiologic subgroups. Although this presents with challenges (e.g., profile variability within a syndrome [27]), it may result in improved interventions and outcomes for those with a shared genetic syndrome.

The individualized nature of ABA interventions and their application to multiple domains make them highly suitable for pursuing this tailored approach. With this perspective, we selectively review literature on the application of ABA in addressing the needs of young children (< 5 years) with IDD. We summarize the literature on focused and comprehensive ABA interventions, as applied to young children with IDD, as well as two specific focused ABA interventions: milieu communication training (MCT) and behavioral parent training.

Early Behavioral Intervention Approaches

Focused and Comprehensive

There are two classes of behavioral interventions: focused and comprehensive. Focused interventions are designed to produce specific behavioral or developmental outcomes. Examples of focused interventions include prompting, reinforcement, and discrete-trial teaching. These interventions are used for a limited time period to demonstrate change in a specific targeted behavior. Decades of research exist supporting the application of focused ABA interventions to target-specific weaknesses among children, youth, and adults with IDD in areas such as communication and challenging behavior [28–30]. The primary focus of these applications,

however, has been on managing problematic behaviors and not development of skills across a variety of domains [31••]. Further, early intervention has not been a focus of this work.

Recent reviews have covered the application of focused ABA interventions to individuals with fragile X syndrome [32•], fetal alcohol spectrum disorder [33•], and other neurogenetic disorders [31••]as well as those that highlight their utility for teaching communication to individuals with DS [34] and in special education for young learners with IDD [35]. These reviews suggest that focused ABA interventions consistently result in positive change in targeted behavior within these populations, but all highlight the limited quantity and scope of research addressing the specific needs of subgroups of IDD. Across the reviews, focused ABA interventions are commonly used for behavior management but do not address other critical areas of need. Many of the authors call for additional applications of focused ABA interventions to populations other than ASD. These reviews also cover the lifespan of individuals with IDD, with only Bouck [35] focusing on applications to early intervention. Further, these reviews also highlight methodological weakness present across the literature, citing lack of quality indicators such as measures of treatment integrity and replication of effects.

A handful of studies have applied focused interventions to young children with IDD, considering the phenotypic weaknesses, and tailoring to the needs of an etiologic subgroup. Among these, children with DS are the most commonly considered group. For example, delays in early communication skills (e.g. requesting and imitation) and gross motor development are identified as weaknesses in the DS behavioral phenotype [36] as is a greater prevalence of obesity among children with DS [37]. Bauer and Jones [38] target the requesting and verbal imitation skills of three young children (< 18 months) with DS. They used most-to-least prompting, time delay, and social reinforcement to increase verbal imitation and early requesting skills while demonstrating collateral changes in intelligibility and problem solving. In another application, video-modeling, prompting, and behavior specific praise were used to increase the physical activity of two preschoolers with DS [39]. These examples demonstrate the potential utility of focused ABA interventions to target phenotypic areas of weakness of individuals with IDD. Given that DS is the most commonly known genetic etiology of IDD and the phenotype likely the most well described [36], it is surprising that there are not more examples of focused behavioral interventions applied to the critical needs of this population.

The research is even more limited for other diagnoses with only a few examples targeting the behavior of other subgroups such as Angelman syndrome, Williams syndrome, and Prader–Willi syndrome [31••]. For example, Williams syndrome is a genetic disorder associated with intellectual disability, outgoing and friendly personalities, and high levels of anxiety [40]. Williams syndrome is also associated with hyperacusis or hypersensitivity to sound [40]. O'Reilly and Lacey [41] explored treatment considerations for this phenotypic characteristic using functional analysis to assess the effects of noise on evoking challenging behavior in a 5-year-old girl with Williams syndrome. They found that reduced background noise and the use of earplugs resulted in reduced frequencies of challenging behavior, suggesting the presence of sound acted as an establishing operation for challenging behavior and that interventionist should consider means to minimize background noise during programming. In a second study, O'Reilly and Lancioni [42] used focused ABA interventions to treat food refusal in a preschool-age child with Williams syndrome. Feeding difficulties are present is as many 86% of individuals with Williams syndrome [43] and result from both behavioral (e.g., tantrums) and medical (e.g., poor suck/swallow abilities) factors. Food refusal decreased following the implementation of several focused ABA strategies including setting a time limit for meals, ignoring challenging behavior, and praise for positive feeding behavior. These examples demonstrate that existing behavioral treatment strategies can be effectively applied to target phenotypic weaknesses among children with Williams syndrome.

Similarly, focused ABA interventions have been applied to target some of the specific weaknesses associated with Angelman syndrome. Angelman syndrome is characterized by severe intellectual disability, seizures, absent or minimal speech, impaired ability to imitate, and a cheerful personality [44]. Summers and Szatmari [45] used discrete trial teaching to teach basic language and learning skills to three young children, ages 3–6, with Angelman syndrome. Over a 1-year period, all three children mastered components of a picture exchange and two of the three children mastered some one-step receptive instructions and imitating motor actions. One child mastered some self-help and visual matching to sample tasks. In a follow-up study, Summers [46] delivered discrete trial teaching targeting motor imitation, receptive language, requesting, and matching to four children with Angelman syndrome ages 3–9 years, some of whom participated in the previous study. Some positive effects were obtained in the targeted skills, but there was no significant increase in standardized measures of cognitive, adaptive, and language functioning for children in the intervention group relative to those in a control group matched on age, gender, and sub-type of Angelman syndrome.

Further research is needed to evaluate the extent to which focused ABA interventions can effectively address the unique needs of various subgroups of young children with IDD. The growth of information on the behavioral phenotypes of various aetiologies of IDD presents a map for the development of targeted interventions for these populations [17, 47]. For domains of need that overlap between IDD and ASD, early focused interventions targeting language, motor skills, social skills, and challenging behavior are likely to be highly

effective and easily adaptable for children with IDD. For critical areas where there is no overlap between ASD and other subgroups, there is a wealth of possible strategies which may be adapted to meet the needs of that subgroup. For example, Lemons et al. [48•] combined several ABA strategies (e.g., prompting, differential reinforcement) to create a reading intervention aligned to the behavioral phenotype of children with DS (6–8 years). Similar focused interventions could be designed to address other phenotypic weaknesses and to meet the needs of other subgroups of IDD such as food stealing within Prader–Willi syndrome [49] and severe self-injury among individuals with Smith-Magenis [50].

In contrast to focused interventions, comprehensive interventions are a set of practices designed to achieve a broader developmental impact on core areas of need in IDD. These interventions occur over an extended period (e.g., year or years), are intense (e.g., 25 h per week), and incorporate many focused ABA procedures such as modeling, prompting, chaining, and direct instruction. Comprehensive interventions based on ABA were pioneered by Ivar Lovaas and colleagues with young children with ASD [51]. Early intensive behavioral intervention (EIBI) is the most extensively researched and there have been multiple studies supporting its use for young children with ASD, often including children with a comorbid intellectual disability. It has been associated with significant improvements in cognitive and adaptive functioning as well as decreased ASD symptom severity [12, 13, 52]. Further, EIBI has been publicly endorsed as the treatment of choice for children with ASD (e.g., US Surgeon General [53]).

While establishing the positive effects of EIBI for children with ASD, ABA as a comprehensive early intensive intervention also seems to have become publicly conceptualized as most relevant to children with ASD [54, 55]. To date, only one study has evaluated the effects of EIBI for children with IDD without ASD. Eldevik et al. [56••] evaluated the effects of EIBI for children with mild to moderate intellectual disabilities. Eleven children with a mean age of 54 months and mean IQ of 56 at intake participated in 10 h per week of 1-on-1 EIBI. A comparison group of 14 children with a mean age 46 months and mean IQ of 50 at intake received treatment as usual. After 1 year, the EIBI group gained an average of 16 IQ points and 3 points in adaptive behavior, significantly larger than changes in the comparison group (effect size of 1.13 for IQ and 0.95 for the adaptive behavior composite). Both studies suggest that EIBI is a promising approach for children with IDD; however, no recent work has attempted to replicate or expand upon these findings.

Eldevik et al. [56••] argue that there are no clear reasons why EIBI should not be effective for individuals with IDD without ASD. Similarly, others suggest that there is sufficient overlap between ASD and intellectual disability to support adoption of EIBI interventions to those without ASD [57]. While many individuals with ASD (as much as 50% [58]) experience comorbid intellectual disability, simply adopting interventions designed for children with ASD to children with IDD has limitations.

Individuals with ASD show different profiles than individuals with IDD including differences in social interaction [59], psychopathology [60], and adaptive behavior [61]. For example, joint attention deficits are a characteristic weakness present in ASD which has led behavioral researchers to develop effective interventions to target this need [62]. Comparatively, children with DS do not display these same deficits and, as a result, require alternatives targeting their needs [63]. Available EIBI curriculums [64] will need to be modified to align with knowledge of behavioral phenotypes and target specific needs of various subgroups. Adapting interventions for a new population may not just be about what to teach, but also on what procedures to select. Individual practices that make up EIBI may be widely applicable, and there is some support for their application to young children with IDD, but future research will need to identify if particular practices are more or less effective for particular subgroups.

One group of researchers has created an early behavioral intervention curriculum responding to the call for interventions aligned to the behavioral phenotype. Jones and Feeley [65••] recently published a curriculum for a comprehensive behavioral intervention focusing on young children with DS. It addresses motor, social-communication, cognitive, self-care skills, as well as strategies for challenging behavior considering the phenotypic strengths and weaknesses of young children with DS. There are no published studies evaluating the comprehensive intervention curriculum outlined in the manual; however, there are a series of single-subject design studies evaluating components of the curriculum with positive outcomes [38, 66–72]. Future research should continue to pursue this line of work, designing focused and comprehensive interventions to meet the phenotypic needs of young children with IDD.

Although there is some support for focused and comprehensive behavioral interventions to various skill areas among young children with IDD, most of the recent work investigating behavioral interventions focuses on young children with ASD [73–78]. Research supporting the effectiveness of ABA in conjunction with policy changes, including mandated insurance coverage of ABA for ASD, has resulted in increases in applications of ABA to children with ASD without a corresponding increase in application to other IDDs [31••]. The disparity in access is dramatic enough that state-regulatory factors and economic incentives related to access to intervention for children with ASD are related to the prevalence of ASD and may even be a factor in the diagnostic recategorization of other IDDs to ASD [79]. Comprehensive and focused ABA interventions have the potential to be a great benefit to young children with IDD, but much research is needed in this area. In the design of future ABA-based

interventions, researchers should draw on the growing literature describing various phenotypic characteristics of IDD as it may result in more effective approaches for individuals with IDD.

Milieu Communication Teaching

Although there are a number of variations of early behavioral interventions using ABA components, milieu communication teaching (MCT) is notable in that it has been applied to young children with IDD with relative frequency. MCT is a naturalistic intervention based on the principles of ABA and social pragmatics [80]. Originally developed by Hart and Risley [80], it involves three core instructional strategies: Mand-modeling (i.e., requesting a verbal response from the child or modeling a verbalization), time delay, and incidental teaching. Over time, additional branches of milieu communication have developed to include enhanced milieu teaching (EMT) which considers additional environmental variables and prelinguistic milieu teaching (PMT), for children who are not yet using words or symbols to communicate.

Milieu teaching approaches and the various iterations have been applied to young children with IDD producing moderately positive language and social communication changes [81–84]. Research on EMT has found significant long-term effects on child communication behavior. Kaiser and Roberts [85] reported significant long-term effects after a year of parent implemented EMT for preschool children with IDD (including DS and ASD) on child communicative behavior [85]. Research evaluating PMT combined with parental training in responsivity for toddlers and young children with IDD has produced mixed results [82–84]. For example, Fey et al. [84] found significant effects of MCT on the rate of intentional communication acts for 51 toddlers with IDD compared to a waitlist control, where Yoder and Warren [82] did not find the same effects. Like other behavioral interventions, there has been a lack of emphasis on populations other than ASD. Only a small number of studies have focused on MCT as applied to young children with IDD and more research is needed to clarify the efficacy of the various iterations.

Some recent work on MCT has begun to explore the effects of intervention intensity and the differences in outcomes for various subgroups [86]. Fey et al. [81] examined the effects MCT intensity for 64 children between the ages of 18 and 27 months old with IDD over the course of 9 months. Participants were randomly assigned to receive one, 1-h session per week or five, 1-h sessions per week. Both groups showed growth in communication; however, participants who engaged in object play with nine or more objects at the beginning of the study showed significantly more growth in vocabulary at post-tests if they received high intensity MCT. To date, there is little research that provides clear findings of cumulative treatment intensity effects for MCT on children with IDD [86], but there is growing support that individual characteristics, such as play skills and etiology, moderate the effects of treatment.

Yoder et al. [87] found the effects of MCT intensity differed across etiologic subgroups of IDD. Their reanalysis of previous data [81] revealed that children between 18 and 27 months old with DS showed greater vocabulary growth when receiving five, 1-h sessions of MCT per week compared to one, 1-h session per week. The same relationship between dose and vocabulary growth was not found for children with other developmental disabilities even after controlling for intellectual ability. The authors hypothesize that phenotypic characteristics such as working memory limitations, oral motor difficulties, congenital hearing loss, and auditory memory deficits affect communication treatment response beyond the presence and severity of intellectual disability [88]. Moreover, increased intensity of MCT may boost key skills (i.e., canonical syllabic communication and receptive vocabulary) associated with later spoken language development for children with DS [89]. Overall, more research relating to these and additional variables of MCT response across etiologic subgroups are needed.

These studies represent an exciting line of research investigating not just the effects of intervention, but into variables which moderate intervention effects. Work in this area will contribute to our understanding on when and why intervention strategies may vary in their effectiveness. While refining interventions to understand optimal intensity and what learner characteristics affect outcomes is important, there is still a need for comprehensive, longer-term intervention studies on MCT applied to young children with IDD. Further, Parker-McGowen et al. [86] note that in order to discern the effects of these moderating variables, future research needs to improve description of learner characteristics (e.g., intellectual status, imitation skills), intensity parameters, and the measurement of treatment fidelity.

Parent Training

Given the role that parents play in a child with IDD's life, parent training procedures have been adapted from the disruptive behavior disorder literature and applied to young children with IDD. Supporting parents of children with IDD reduces the risk of later problem behavior and supports family well-being and parent mental health [90–92]. Several behavioral parent training models have been empirically validated and demonstrate efficacy in improving challenging behavior for young children with IDD (see McIntyre [93] for a review).

For example, McIntyre [91] adapted Webster-Stratton's Incredible Years Parent Training (IYPT), an evidence-based parent training program [94], for use with parents of preschool children with IDD of mixed aetiologies (IYPT-DD). Adaptations for IDD include information about raising a child

with disabilities, advocacy and community resources, and functional behavioral assessment and intervention. Multiple studies have investigated the effects of the program with families with a preschool-aged child with IDD (including children with ASD) [90, 91, 95–97] finding positive results. Large reductions in negative parent-child interactions and child behavior problems were found over time for the intervention families in a randomized controlled trial evaluating the program for young children with IDD, [91].

Similarly, Triple P (Positive Parenting Programme) is an evidence-based [98, 99] intervention that has been modified for parents of a child with IDD to prevent behavioral and emotional problems (Stepping Stones Triple P [100, 101]). The program uses a public health approach, whose programs vary in intensity, mode, and context. Several reviews and meta-analyses of the SSTP program have been conducted. Most recently, Ruane and Carr [102] reviewed 16 studies with data from over 900 families with a child with IDD (including children with ASD, DS, cerebral palsy, among others). They found significant moderate effect sizes for observed child behavior and parenting style, as well as significant effect sizes for parent-reported problems, parenting satisfaction and self-efficacy, parental adjustment, and parental relationship. These findings confirm the efficacy of the SSTP program among families with young children with IDD.

Other similar behavioral parent training programs have been developed specifically for families of children with IDD, such as Signposts for Better Behavior [103]. Taken as a whole, recent studies on behavioral parent training suggest positive effects on reducing challenging behavior in children with IDD and some support for effects on parenting behavior and mental health, though these are less clear. Still, many of the studies of these programs would benefit from more rigorous study procedures, such as the inclusion of control and comparison groups, treatment integrity, and measures of generalization and maintenance [93].

The broad applicability of these programs is being tested as researchers begin to adapt of these behavioral parent programs for international applications. Differences in parenting beliefs and practices may influence adoption of parent training programs across culturally diverse populations [104]. In order to address these differences, Kong and Au [105] adapted the IYPT-DD program for use in Hong Kong with 3–6-year-old children with developmental disabilities. Using a waitlist-controlled trial, they found significant reductions in parenting stress and child behavior problems and increased supportive parenting and improved parent-child interaction for the intervention group. These results suggest that the program can be adapted to effectively meet the needs of parents in other cultures. More work will be needed to replicate across other populations and with other parent training programs.

Like other behavioral applications to IDD, almost all the behavioral parent training programs do not consider subgroups of IDD aside from children with ASD. Only one group of researchers has combined knowledge of behavioral phenotypes with behavioral parent training. Recently, syndrome-specific modules to enhance the SSTP were developed and are currently being evaluated in Australia [106•]. The groups include ASD, DS, fragile X, fetal alcohol spectrum disorder, Williams syndrome, Prader–Willi syndrome, and velocardiofacial syndrome/22q deletion syndrome. Each syndrome-specific module includes a parent tip sheet, a practitioner resource sheet, and strategies tailored to the group. For example, activity schedules are recommended for children with fragile X to help with difficulties in planning and transitions. Activity schedules may help by providing visual prompts for daily routines. It is still to be determined if the modified program will improve outcomes above and beyond the traditional models of delivery.

Conclusions

Children with IDD have needs which present early in life and early intervention may prevent or ameliorate later deficits. Unfortunately, there has not been a significant amount of robust research on behavioral interventions for addressing the needs of young children with IDD without ASD. Much of the research on focused behavioral interventions targets challenging behavior, rather than skill building. Evaluations of comprehensive behavioral interventions have not emphasized children with IDD and there is a need to illustrate the utility of interventions established among individuals with ASD with other populations. Likely, the lack of work in this area is a result of little incentive available for carrying out this expensive and time-consuming research [107•].

Recent work in parent training and in focused and comprehensive behavioral interventions has begun to explore incorporating knowledge of the behavioral phenotype into intervention [65••, 106•]. Further, Fey and colleagues have considered how varying the intensity of MCT intervention affects outcomes for various subgroups [87]. Much work is still needed to develop interventions tailored to meet the needs of specific subgroups and which examines the interactions between etiology and various parameters of intervention such as intensity. This might result in the development of modular approaches to intervention which can be applied flexibly to individualize treatment [25]. Further work will be needed to demonstrate whether these tailored interventions result in greater improvements than other approaches to intervention.

Additionally, work in the area of behavioral parent training [105] has begun to consider how to best meet the needs of families of young children with IDD from various cultural backgrounds. Researchers in other areas of early behavioral intervention should focus on increasing the participation of families from diverse cultural, linguistic, and socioeconomic

backgrounds, as well as modified programming to better meet the needs of these families.

Finally, multiple reviews highlight the failure to meet research quality indicators or sufficiently describe sample characteristics and treatment intensity characteristics [34, 86]. Researchers will need to continue to address methodological weaknesses within the literature applying behavioral intervention to young children with IDD.

We have provided a brief summary of the evidence supporting the application of ABA for addressing the needs of young children (< 5 years) with IDD. Behavioral treatments are well established for young children with ASD, but still not well developed for young children with IDD without ASD. Growth in the knowledge of the behavioral phenotype has the potential to inform more effective approaches to intervention, but this promise has yet to be demonstrated. Future work will need to consider the needs of diverse groups and conduct work with methodological rigor.

Compliance with Ethical Standards

Conflict of Interest Nicole Neil and Kailee Liesemer declare no conflicts of interest relevant to this manuscript.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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