



Part C Early Intervention dosage and growth in adaptive skills from early childhood through adolescence



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ARTICLE INFO

Article history:

Received 19 November 2014

Received in revised form 19 January 2018

Accepted 23 January 2018

Keywords:

Part C Early Intervention

Adaptive behavior

Developmental disabilities

Longitudinal method

Dosage

ABSTRACT

The present study explored the association between the dosage level of Part C Early Intervention (EI) services and growth in adaptive behavior from early childhood through adolescence for children with developmental disabilities. Children who received more hours of service than expected based on their characteristics and those of their family measured at EI intake had greater skills in communication, socialization, and daily living skills when they ended EI services at EI. In addition, children who received more hours of service showed greater improvements in all three domains of adaptive behavior over time. The short- and long-term benefits of higher dosage levels of EI services suggest that Part C EI practices and policies should be geared toward increasing service hours, either by increasing the number of hours of scheduled service or minimizing disruptions to scheduled service.

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1. Introduction

One of the major tasks for all children, including those with developmental disabilities, is to acquire skills in adaptive behavior. Adaptive behavior includes skills that individuals typically use to meet the personal and social demands of daily life (Lambert, Nihira, & Leland, 1993), including abilities needed for communication, socialization, and daily living activities (Sparrow, Balla, & Cicchetti, 1985). In contrast to assessments of intellectual functioning, assessments of adaptive behavior focus on the tasks that children engage in routinely rather than the ones that they have the capacity to demonstrate but may use only rarely (Widaman & McGrew, 1996).

There is a small body of research on the growth of adaptive behavior for children with developmental disabilities. These studies indicate that children with intellectual disability (Chadwick, Cuddy, Kusel, & Taylor, 2005) and children with a range of developmental disabilities (Shonkoff, Hauser-Cram, Krauss, & Upshur, 1992) are at risk for lower levels of adaptive functioning than typically developing children. Moreover, analyses of trajectories of

adaptive behavior indicate that, although children with developmental disabilities demonstrate growth in these skills, they seldom reach levels of functioning displayed by typically developing children during the early and middle childhood years (Chadwick et al., 2005; Dieterich, Hebert, Landry, Swank, & Smith, 2004; Hauser-Cram, Warfield, Shonkoff, & Krauss, 2001).

Few studies, however, have assessed whether aspects of early childhood intervention relate to changes in children's adaptive functioning within this population. Baghdadli and colleagues (Baghdadli et al., 2012) modeled trajectories of adaptive development over 10 years for children with autism spectrum disorder (ASD) in France. Adaptive behavior was assessed at three time points (at approximately ages 5, 8, and 15), and the number of hours of specialized interventions received per week over the course of the first three years of study participation were gathered by research staff during interviews. Greater hours of intervention increased the likelihood of following a trajectory of greater growth in communication skills.

Anderson, Oti, Lord, and Welch (2009) investigated trajectories of social skills over the course of 11 years from toddlerhood through adolescence for three groups of children: (1) children with autism spectrum disorder, (2) children with pervasive developmental disorder-not otherwise specified (PDD-NOS), and (3) children with developmental delays. Data on the number of hours

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of both educational and specific (e.g., Applied Behavior Analysis) treatments from toddlerhood through age 5 were gathered from parent diaries and interviews. Intervention intensity for each child was characterized as “none,” “some,” or “more” with the categories of “some” and “more” representing, respectively, groups below and above the median of the distribution of total hours, not including zero. All three diagnostic groups experienced significant growth over time, but the rate of growth was slowest for children with ASD. Controlling for diagnostic group membership, children receiving “more” hours of intervention made significantly greater gains over time than children in both the “some” and “none” categories.

Although evidence on the relation between early childhood services and change in children’s adaptive behavior is sparse, it is suggestive of a dosage effect. Overall, past studies provide evidence of improvement in social and communication skills for individuals with ASD as a result of greater hours of specialized intervention. These findings are consistent with existing research suggesting that these domains are amenable to change during early childhood (McConnell, 2002; Rogers, 2000). However, studies have primarily reported findings for children with ASD receiving fairly specific and intensive therapeutic interventions, in contrast to Part C Early Intervention services. In addition, the majority of studies have not isolated the influence of intervention from that of other child characteristics.

1.1. Early Intervention services

The Education for All Handicapped Children Act Amendments of 1986 (PL 99–457) established the Part H program (subsequently renamed Part C) with the purpose of enhancing the development of infants and toddlers with developmental disabilities from birth to 3 years. In the United States, Part C Early Intervention (EI) services are central during early childhood for children with developmental delays and disabilities. Similar programs exist in other countries as well (Guralnick, 2011). EI programs target infants and toddlers, as research suggests that optimal child development is formed by the quality and timing of experiences during the first years of life (Shonkoff & Phillips, 2000). Additionally, the program was designed to provide a system of supports to increase the capacity of families to meet these children’s needs (Guralnick, 2011).

Several researchers have found that EI services for children with disabilities are associated with significant improvements in children’s developmental trajectories as well as enhanced experiences within families (Guralnick, 2011; Hebbeler et al., 2007; Warfield, 1994). Nevertheless, to date, there is little information examining the long-term development of children in relation to the EI services they received. There is evidence, however, that early childhood programs can have sustained effects on children’s competence and adaptive functioning into adolescence and adulthood from analyses of programs such as the Abecedarian Project, Perry Preschool and the Chicago Parent Child Program (Barnett & Masse, 2007; Belfield, Nores, Barnett, & Schweinhart, 2006; Reynolds, Temple, Robertson, & Mann, 2002).

A follow-up investigation of the largest longitudinal study in the United States of early intervention services ($N=298$), the National Early Intervention Longitudinal Study (NEILS), reported that a low percentage of the children served met developmental milestones in motor, cognition, communication, and independence skills by kindergarten (Scarborough, Hebbeler, Spiker, & Simeonsson, 2011). Only 18% of those with a diagnosed disability, 31% of those with developmental delay, 40% of those who had an “at risk” condition, and 50% of those with an exclusive speech or language delay reached developmental milestones expected by 60 months of age. The relations between features of EI services and children’s developmental milestones were not explored, however.

1.2. Established approaches to quantifying level of EI services

Researchers have primarily relied on three approaches to quantifying level of EI services in consideration of developmental outcomes: duration, intensity, and comprehensiveness (Guralnick, 1998; Ramey & Ramey, 1998). *Duration* involves the length of time in service. In EI, duration is often related to age of intake, as children who enter these services at an earlier age are likely to have a longer duration of service (Hebbeler et al., 2007). Children and families can leave EI before age 3, but only a low percentage do (Hebbeler et al., 2007). The process of making a referral to EI also affects duration. Since the majority of referrals to EI are made by pediatricians and other health care personnel, the age at which a condition can be diagnosed and/or when delayed development can be detected varies (Bailey, Hebbeler, Scarborough, Spiker, & Mallik, 2004; Hauser-Cram & Warfield, 2009; Scarborough et al., 2004). Thus, some children (e.g., children with genetic disorders such as Down syndrome) enter EI soon after birth, whereas other children (e.g., those with a language delay) may not enter until age 2 or later.

Intensity has generally been defined as hours of contact by an interventionist with a child and/or parents within a specified time frame, such as one week (Innocenti & White, 1993). Excluding the intensive services provided in some states for children diagnosed with ASD (Henderson, 2011), early intervention services average to about 2–3 h a week (Hallam, Rous, Grove, & LoBianco, 2009; Hebbeler et al., 2007).

Comprehensiveness involves the number of different services a child and family receive to meet their needs. Types of services have been categorized in two ways. One approach has been to examine the list of child and family services defined in the Part C regulations as appropriate for EI, including occupational and speech therapy, parent information and training, service coordination, parent support groups, and the array of different providers (e.g., educators, therapists, nurses, social workers) with expertise to provide these services (Epley, Summers, & Turnbull, 2011). A second approach has been to categorize services based on where they are provided (e.g., home or center), whether they are group-based or one-on-one, and whether they include the child only, the parent only (e.g. parent support groups) or the parent and child together (Shonkoff et al., 1992). For the purposes of this study, the former will be referred to as *comprehensiveness of provider* and the latter will be referred to as *comprehensiveness of format*.

1.3. Challenges to assessing the impact of EI services

Evaluating the impact of Part C EI services is challenging due to the myriad of services available, individualized service provision, and policies which mandate that services be available to all children who meet eligibility requirements (Guralnick, 2005). Children with greater need based on their developmental profile at intake will receive more weekly Part C EI services (intensity) over a greater length of time (duration) from a wider range of providers (comprehensiveness of provider) in a broader range of formats (comprehensiveness of format). The amount and type of services received are guided by Individualized Family Service Plans (IFSPs) that are jointly developed by families and service providers and re-evaluated and re-defined over time depending on the child’s progress and the changing needs and desires of the family (Hauser-Cram & Warfield, 2009). Using only the established approaches to quantifying level of EI service may be misleading because children with greater duration, intensity and comprehensiveness are likely to show fewer gains in adaptive skills over time, purely as a function of their initial developmental challenges.

The second challenge to assessing impact of EI services on child outcomes is the mandate that services be available to all children who meet eligibility requirements. Conventional experi-

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