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Age-related trends in treatment use for children with autism spectrum disorder

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ABSTRACT

Numerous and increasing treatment options face parents of children with autism spectrum disorder (ASD). This study sought to elucidate age-related trends in treatment use among children with ASD from the Simons Simplex Collection (SSC; $n = 2758$). Our goals were to: (a) explore frequencies of use for various treatment types between preschool and adolescence, and (b) statistically compare rates of treatment-type use by children of different ages. Results indicated high reliance on school-based treatments (e.g., speech and occupational therapies), though use of these types of treatments decreased with age. Use of most treatment types peaked during the preschool years and decreased with age, except psychotropic medication, which was used more by older children. A stable proportion of the sample across ages endorsed biomedical treatments (i.e., complementary alternative medicine; CAM). Percentages of treatment-type use at three different ages (representing early childhood, middle childhood, adolescence) via Pearson chi-square analyses indicated significant associations ($\alpha < .006$) between age and use of these treatment types: private and school-based speech, private and school-based occupational therapy, intensive behavioral treatment, and psychotropic medication. Results are considered within an ecological-behavioral framework to offer potential explanations for age-related differences in treatment use (e.g., family factors, special education legislation).

1. Introduction

Children with autism spectrum disorder (ASD) present with a range of symptomatology, related both to core features (e.g., social-communication deficits, restricted interests/repetitive behaviors) and comorbidities (i.e., physical, emotional, behavioral). As such, treatment decisions are complex and diverse. Numerous treatment options have been proposed to address the needs of persons with ASD, such that the number of proposed ASD treatments far exceeds the pace of efficacy research (Matson, 2007). The wide array of ASD treatment options ranges from evidence-based practices (EBP; e.g., Discrete Trial Teaching) to comprehensive treatment models (e.g., TEACCH, Denver Model) to complementary and alternative medicine (CAM; e.g., vitamin/mineral supplements, special diets, chelation) to psychotropic medications. Understanding types of treatments available for parents to choose from for their children, as well as information about their efficacy and

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popularity, allows providers a better foundation for collaborating with and guiding treatment decisions to support families and enhance outcomes for those with ASD.

1.1. Treatment categories

Parents often use a variety of treatments simultaneously, some of which are evidence-based and some that are not (Green et al., 2006; Smith & Antolovich, 2000). Interventions with foundations in behavioral theory are the most investigated (Makrygianni & Reed, 2010) and often considered first-line treatments for ASD (Stahmer & Aarons, 2009; Vismara & Rogers, 2010). Behaviorally based interventions target skills across multiple domains, including communication, socialization, and motor skills. The National Professional Development Center on ASD (NPDC) recently identified 27 interventions as being evidence-based for the treatment of ASD-related symptoms (Wong et al., 2013). Studies meeting EBP criteria mostly were aimed at improving communication and social skills (ASD core symptoms), followed by studies that focused on decreasing challenging behaviors. Overall, more interventions meeting NPDC's EBP criteria targeted preschool and elementary school age children compared with those that focused on other ages. Of the 27 EBPs identified as effective (i.e., demonstrated measurable improvement on targeted goals), 92.6% had been studied for preschoolers (3–5 years) and 100% for elementary school-age children (6–11 years). Fewer treatments addressed those below age 3 years (40.7%) or high school age (15–18 years; 70.4%) and older (e.g., young adults; 48.1% of the 27 EBPs identified).

Ascertaining rates of use for different treatments is challenging because terminology and methodology used to categorize treatments varies widely. However, in an internet-based survey of 552 parents of children with reported ASD diagnoses, Green et al. (2006) found that 56.3% of the sample used ABA-based therapies, which primarily constitute the NPDC's EBPs and are often considered the "components" of more comprehensive intervention programs (Wong et al., 2013). Categorizing treatment use is complicated by trying to separate *what* is done (i.e., specific strategies/treatment approaches) from *where* (i.e., service delivery setting) and *by whom* (i.e., trained specialist, parent). For example, in the NPDC review, Wong et al. (2013) identified both the Picture Exchange Communication System (PECS) and Functional Communication Training (FCT) as evidence-based practices, which often are delivered within the context of speech therapy. Similarly, other EBPs identified by NPDC are likely integrated into speech, occupational, and physical therapies (i.e., prompting, reinforcement). Indeed, speech (ST) and occupational therapies (OT) are among the most common therapy types used by families of children with ASD, either privately and/or within school settings (Bitterman, Daley, Misra, Carlson, & Markowitz, 2008; Green et al., 2006; McLennan, Huculak, & Sheehan, 2008; White, Scahill, Klin, Koenig, & Volkmar, 2007). Interventions targeting speech/language typically incorporate behavioral principles and yield positive gains in children with ASD (e.g., Lerna, Esposito, Conson, & Massagli, 2014). However, research regarding efficacy of OT for skill building in children with ASD is lacking (Myers et al., 2007).

Comprehensive treatment models (CTMs) target ASD symptoms by integrating several focused intervention practices and are intensive in their application (i.e., many hours per week, over the course of many months or even years) (National Research Council, 2001; Rogers & Vismara, 2008). Odom, Boyd, Hall, and Hume (2010) reviewed 30 CTMs (e.g., applied behavior analysis-based models, such as Pivotal Response Treatment [Koegel & Koegel, 2006]; developmental and relational models, such as the Denver Model [Rogers et al., 2006]; and eclectic models, such as TEACCH [**T**reatment and **E**ducation of **A**utistic and **C**ommunication related handicapped **Ch**ildren; Mesibov, 1997]). The CTMs reviewed varied widely in terms of the evaluated dimensions. Programs with the strongest evidence of "model development" (i.e., well-documented procedures, replicated, some evidence of efficacy) included the Denver Model, Learning Experiences: An Alternative Program for Preschoolers and Parents (LEAP), Lovaas Institute, May Institute, and Princeton Child Development Institute (PCDI). Odom et al. pointed out that several other models reviewed had relative strengths (e.g., Autism Partnerships, Responsive Teaching, TEACCH), while some received very low profile ratings across all dimensions (e.g., Eden, Summit, Son Rise). CTMs often are designed to target individuals within specific age ranges: 67% of the 30 CTMs reviewed by Odom et al. (2010) applied to infants (ages 0–2) but 100% applied to preschool children (ages 3–5); 83% applied to the elementary age (6–11 years), while 57% applied to middle schoolers (12–14 years), 47% to high schoolers (15–18 years), and 47% to adults (19+ years).

A wide variety of biomedical, or Complementary and Alternative Medicine (CAM), treatments also are marketed for ASD, and more than 70% of parents of children with ASD have tried at least one CAM therapy (Christon, Mackintosh, & Myers, 2010). Symptoms targeted by these treatments vary greatly, but the general aim of CAM is to create biological changes (e.g., through special diets, chelation therapy) or improve sensory or other experiences for individuals with ASD (e.g., through animal therapy, auditory integration training) (Christon et al., 2010). The National Center for Complementary and Alternative Medicine (NCCAM; 2011) notes that the definition of CAM is continually changing but that generally CAM treatments are used either in addition to or in place of traditional medical treatments, though the boundaries between CAM and traditional medical approaches are not absolute. Because most CAM practices have not been subjected to scientific scrutiny (Levy & Hyman, 2005) professionals may hesitate to recommend these. Huffman, Sutcliffe, Tanner, & Feldman (2011) reviewed CAM treatments often used for children with ASD (e.g., vitamins, proteins/amino acids, dietary supplements) and concluded that "marginal evidence" (i.e., minimum of one group design or two single-subject design studies) was reported for the use of proteins/amino acids to treat impaired social interaction. However, research support for the use of CAM treatments to treat other symptoms associated with ASD was lacking, though this was likely impacted at least in part because the number and scientific rigor of studies of CAM treatment on other core ASD symptoms was limited. Nevertheless, parents often include CAM in their children's treatment plans when they (a) are disappointed with the results yielded by traditional or empirically based treatments (Levy & Hyman, 2005); (b) lack knowledge about effective ASD