

## Changes in Academic Demands and Attention-Deficit/Hyperactivity Disorder in Young Children

The prevalence of attention-deficit/hyperactivity disorder (ADHD) among children in the United States has doubled since the 1970s.<sup>1</sup> Possible reasons include changes in diagnostic criteria and epidemiological methods, shifts in national policy regarding disability and special education, marketing of ADHD medications by the pharmaceutical industry, and secular trends such as the effect of electronic media.

Increasing academic demands on young children can also affect the diagnosis of ADHD. For example, beginning kindergarten a year early, for example, doubles the chance that a child will receive medications for behavioral issues.<sup>2</sup> We hypothesized that increased academic demands since the 1970s have contributed to the rise in ADHD.

**Methods** | We searched educational and public policy literature for studies documenting time children spent on academic activities in the United States since 1970. We used these sources to estimate changes in academic demands on young children.

**Results** | From 1981 to 1997, time spent on academic activities increased substantially for young children (Figure 1).<sup>3</sup> The percentage of 9-year-old children reporting having any homework the previous day also increased.<sup>4</sup> As homework and reading activities increased, time for playing and leisure activity decreased.<sup>3</sup>

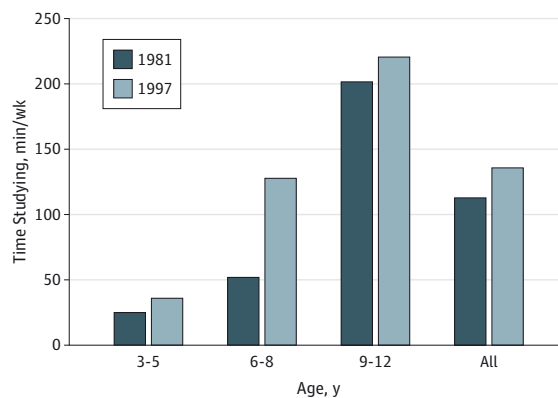
Preschool children showed even greater evidence of increased academic activity. From 1981 to 1997, time spent reading for children ages 3 years to 5 years tripled from 29 minutes to 84 minutes per week.<sup>3</sup> From 1993 to 2005, the percentage of family members reporting that they frequently taught 3- to 5-year-old children letters, words, or numbers increased from 58% to 77%.<sup>5</sup> In the late 20th century, 3-year-old and 4-year-old children also spent more time in formal out-of-home programs (Figure 2).<sup>6</sup> The percentage of young children enrolled in full-day programs increased from 17% in 1970 to 58% in the mid-2000s.<sup>6</sup>

**Discussion** | We found evidence of increased academic demands on very young children that coincides with the increase in prevalence of ADHD, although this does not prove causality. Furthermore, early-prevalence studies of ADHD did not report rates among very young children, so we cannot conclude that the decades-long increase is primarily among children younger than 6 years old.

The studies we used were not designed to test our hypothesis and thus do not provide direct evidence of changes in academic activity. Nonetheless, the variety of sources and consistency of our findings provide confidence that there has been a substantial increase since the 1970s.

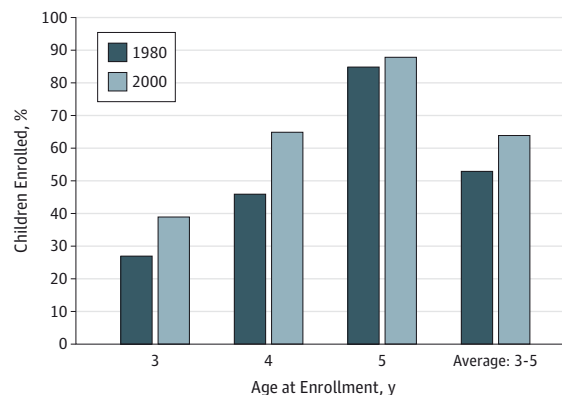
It is not surprising that increased academic demands would lead to the diagnosis of ADHD. Although it is a neurobiological condition with genetic causes, ADHD is defined by behaviors that are age dependent, related to the demands of the environment, and occur on a spectrum of typical behavior of children. Diagnosis is based primarily on teacher and care-

Figure 1. Time Spent Studying per Week



Derived from data in the report by Hofferth and Sandberg.<sup>3</sup>

Figure 2. Enrollment in Preprimary Programs



Derived from data from the National Center for Education Statistics, US Department of Education.<sup>6</sup>

giver reports, which should be influenced by expectations for behavior. As young children face increased academic demands, some will be seen as outliers and will be diagnosed as having ADHD.

Debates on how best to educate young children should be based on available research. Our work suggests that increased academic demands have adversely affected a significant portion of young children. More research is needed to explore the neurobiological and environmental causes of ADHD.

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*Critical revision of the manuscript for important intellectual content:* Brosco.

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*Study supervision:* Brosco.

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## Use of Mobile Technology to Calm Upset Children: Associations With Social-Emotional Development

Although it is known that parents of infants and toddlers with difficult behavior disproportionately use television and videos as calming tools,<sup>1</sup> there are no published data regarding to what degree mobile technologies (such as cell phones and tablets) are used for this purpose. Previous qualitative work with parents has suggested that parental perceived control, defined as feelings of control over children's behavior and development, may determine how parents set limits around screen media use<sup>2</sup> and respond to difficult child behavior.<sup>3</sup> We therefore sought to further explore this observation by examining associations between the social-emotional development of toddlers and mobile media use in a sample of parent-toddler dyads, and to determine whether potential associations are modified by parental perceived control.

**Methods** | The study was deemed exempt by the Boston University Medical Center institutional review board. We surveyed 144 English- or Spanish-speaking parents of healthy children 15 to 36 months of age who were recruited from an urban primary care clinic and 3 Women, Infants, and Children nutrition centers. Survey instructions, questions, and answer choices were read to participants by research assistants. After collecting demographic information, we assessed social-emotional development using the validated Baby or Preschool Pediatric Symptom Checklist.<sup>4,5</sup> Mobile technology use by children was queried using 6 questions adapted from prior surveys<sup>6</sup> asking about the likelihood of allowing smartphone or tablet use by children during different situations, including to calm them down, keep them quiet, while eating, in public, to get chores done, or at bed-

time. Six items from the Parent Opinion Survey<sup>7</sup> assessed parental perceived control regarding their child's development, social relationships, and behavior. Using multivariable logistic regression, we modeled the odds of being somewhat/very likely to allow a child to use mobile technology in different situations, using the child's social-emotional score on the Baby or Preschool Pediatric Symptom Checklist as the primary predictor, controlling for all covariates whose removal from the model changed odds ratios by more than 10%. We then stratified analyses by parental perceived control, which was split at the median value. Owing to sample size limitations, tests for interactions were not performed.

**Results** | Caregivers were primarily mothers (81.3%) of non-white race (78.7%) and foreign-born (64.0%), with a mean (SD) age of 31.6 (7.2) years (**Table 1**). Compared with children without social-emotional difficulties, children with social-emotional difficulties (Baby or Preschool Pediatric Symptom Checklist score  $\geq 9$ ; 58 of 144 children [40.3%]) had a higher prevalence of being given mobile technology as a calming tool when they were upset (61.8% vs 38.1%;  $P = .01$ ) and to keep peace and quiet in the house (69.6% vs 51.2%;  $P = .03$ ); however, there were no differences during other situations such as eating, being in public, doing chores, or at bedtime. After adjustment for potential confounders, associations between social-emotional difficulties and mobile technology use persisted (**Table 2**). Such associations were stronger among parents with low vs high perceived control for calming down (adjusted odds ratio [AOR], 7.63 [95% CI, 2.07-28.1] vs AOR, 1.52 [95% CI, 0.45-5.13]) and for keeping peace and quiet in the house (AOR, 6.48 [95% CI, 1.52-27.7] vs AOR, 2.90 [95% CI, 0.75-11.2]).

**Discussion** | This cross-sectional analysis showed significant associations between increased social-emotional difficulties in toddlers and the tendency of low-income parents to use mobile technology to calm their children or keep them quiet, particularly parents who expressed lower perceived control over their children's behavior and development. While reverse causation can also explain this finding (ie, the exposure to technology affecting social-emotional development), we intentionally stratified analyses by perceived control in order to explore the hypothesis that frustration with the child's behavior would lead to use of digital media as a coping strategy. However, we recognize that these results are exploratory and are from a modest-sized low-income sample, so they may not be generalizable. Longitudinal studies are needed to understand the transactional relationship between the use of digital technology and the developmental trajectories of children.

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