The High Economic Costs Associated with ADHD

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ADHD appears to have an adverse impact on many major life activities and health outcomes. Consequently, ADHD is also associated with a high economic burden, not just for direct medical care costs for the child, but in indirect costs associated with various forms of impaired functioning.

I was able to locate 29 relevant studies on the economic costs associated directly or indirectly with ADHD. Each study focuses on a very narrow aspect of the issue. I have grouped these findings into those reflective of direct costs related to the medical care of the individual and indirect costs reflecting the economic impact of ADHD on other outcomes—lost work, poor driving—for which a cost can be calculated. In their totality, the results clearly demonstrate that ADHD poses a considerable cost to families, insurers, government health care providers, and society more generally. To find a common metric for comparisons across these studies, I translate these costs to the U.S. population of children who may have ADHD, 5.2 million (as of 2010: approximately 74 million, 18 and under, x 7%ADHD prevalence) and that of adults 12.7 million (255 million x 5% ADHD prevalence).

Direct Costs of ADHD – Medical Care

For a child with ADHD, the incremental medical costs have been estimated to be $949 (Gupte-Singh, Singh, & Lawson, 2017) to $1,220 (Swensen et al., 2003) greater per year over that for typical children. When extrapolated to the U.S. child population, this amounts to a range of $4.92 billion to 6.3 billion per year for medical care costs beyond that of typical children. In Europe, one study estimated such incremental costs to be $885 (Euro) per child with ADHD per year in the Netherlands (vs. children with behavioral problems) and $996 (Euro) (vs. control children) (Hakkaart-van Roijen et al., 2007). Translated to U.S. dollars, the totals are comparable.

Other research has placed the per child incremental costs over a 9-year period to be $3,378, for children with ADHD in the US, or $17.6 billion, which was more than double those costs for children without ADHD ($6,158 vs. 2,780)(Leibson, Katusic, Barbaresi, Ransom, & O'Brien, 2001). One study estimated the incremental costs per year solely for adolescents with ADHD were $1,447 per adolescent in the U.S. (Swensen et al., 2003).

Other countries have also found markedly higher medical care costs associated with childhood ADHD. For instance, the total medical costs in Australia over a 6-year follow-up period for children with ADHD was estimated to be $25–30 million (AUS dollars) (Sciberras et al., 2013).

What about adults with ADHD? The few studies that evaluate this issue place the per adult per year differential costs for adults with ADHD relative to typical adults at around $2,880 (Secnik, Swensen, & Lage, 2005) to $3,456 in the U.S. (Swensen et al., 2003; Gupte-Singh et al., 2017). Using the above estimates for the prevalence of adult ADHD from the 2010 census multiplied by these cost estimates results in the additional costs to society per year would be approximately $36.6 billion to 43.9 billion.

Or take the incremental costs for employers who provide health care to adults with ADHD. Employees with ADHD were found to cost employer health plans $2,643 more per employee per year than typical employees (Kessler, Lane, Stang, & Van Brunt, 2009). When extrapolated to the U.S. population of adults with ADHD, the total health care cost is comparable to that found in the studies above—in the billions.

Clearly, in the States, the medical care costs for individuals with ADHD is substantial. Adding the child and adult estimates together we can surmise that ADHD costs $41.5–50.2 billion per year in extra medical care alone, beyond that received by the typical population. But ADHD results in other costs to society as well, which I discuss below.

Indirect Costs

Burden to Families. A recent study by Zhao and colleagues (2019) estimated the burden to families of raising a child with ADHD over a 12-year period to be five times the total financial burden evident in control families ($15,036 vs. $2,848), which is an additional $1,000 per year. While these costs borne by families included those connected to behavioral and educational problems, they did not include the costs of direct treatment with medication or other forms of therapy. Costs associated with accidents, injuries, legal involvement, and discipline were included. Indirect costs, reflecting loss of parental income from missing work, loss of a job, additional childcare expenses, and parental mental health concerns were incorporated. Extrapolated to the U.S. child population on a per annual basis places this burden on families at $5.2 billion. While not a direct monetary cost of care, parents of children with ADHD also reported being more tired, stressed, less able to concentrate at work—resulting in the need to reduce work hours to deal with their child's problems (20% vs. 3% for controls).

Earlier, Altszuler et al. (2016) also reported an increased burden on parents of a young adult with ADHD—including , 20% more likely to provide emergency funds, more likely to provide funds for living expenses, as well as more likely to have a child move back home. Another study found incremental indirect costs to be $337 per child with ADHD related to parental disability and work absenteeism (Swensen et al., 2003), thus adding another $1.7 billion annually to these indirect costs for family burdens.

Criminality. Children with ADHD are far more likely than typical children to engage in various forms of antisocial

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behavior and have a far higher risk for developing conduct disorder by adolescence and antisocial personality disorder by adulthood. One study estimated that the incremental costs per child with ADHD over a 13–15 year interval of follow-up to be $12,370 inclusive of victim and criminal justice system costs (Swensen et al., 2001). Applying these figures to the approximate proportion of the U.S. child population with ADHD (3.7–5.9 million as of the 2010 census), these total costs range from $45.8 billion to 72.8 billion across this follow-up period, or $3 to 5.6 billion annually. Other research shows the total victim costs associated with child and adolescent ADHD to be $50-70 million dollars per year in the U.S. population and total criminal system-related costs to be $2–4 billion annually (Fletcher & Wolfe, 2009), a figure relatively consistent with the follow-up study above when extrapolated to the follow-up interval. Such criminal and victim costs are in addition to those estimated for medical care and family burdens above.

Work Loss. As shown in several studies of adults with ADHD, as well as children followed to adulthood, ADHD is associated with a significant detrimental impact on employment. According to one study, over their lifetime adults with ADHD earn $543,000 to $616,000 less income than do typical adults, or about 25% less per month (Swensen et al., 2003). This translates to a total lifetime of lost income for the adult ADHD population of $6.9 trillion at a minimum.

Studies in Europe paint a similarly bleak picture for the work domain. In the Netherlands, the reduction in work productivity for mothers that was associated with ADHD in their child was estimated to be $2,243 (Euro) compared to just $408–647 (Euro) for mothers of typical children or those with only behavioral problems. This represents an incremental cost of $1,835 (Euro) per child per year compared to typical families (Hakkaart-van Roijen et al., 2007).

Studies show that significantly fewer children with ADHD complete high school, and fewer still are employed on reaching young adulthood (24% vs. 59%). Their average household income per person has been estimated to be approximately $10,000 less per year than in control cases followed at the same time (Barkley, Murphy, & Fischer, 2008; Biederman & Faraone, 2006). Again, this results in a total loss of $65 billion in lost annual income when extended to the total adult U.S. working population estimated to have ADHD (5%, or 6.5 million adults)

Another study reported that employees with ADHD cost their employers an economic loss of $4,336 per worker (Kessler, Lane, Stang, & Van Brunt, 2009). Again, scaling this figure up to the total U.S. working population results in an estimated loss of $28.2 billion per year.

Educational Costs. The costs associated with supplementing the education of children with ADHD are also high. One study placed the annual costs to school systems for each ADHD student are $4,689 per year more than costs for typical students. These costs include special education, grade retention, disciplinary actions, and total additional staff time (Robb et al., 2011). Assuming that there are at least 4.3 million children of school age who have ADHD (7% x 62 million), this would translate to annual costs of $20.2 billion. Looking just at preschoolers with ADHD, a different study placed the cost at 2–6 times more per student than those without ADHD, with an average cost of $16,548 per student totaling to $16–48 million overall for preschool care (Marks et al., 2009).

Driving. Research demonstrates that teens and adults with ADHD receive significantly more traffic citations, are more likely to speed with a motor vehicle, and have 2–3 times the frequency of car crashes than do typical peers. Incremental costs per crash were estimated in one review of this literature to be $2,600 per incident (Barkley & Cox, 2007). When that is multiplied by an average of three incidents more than typical drivers during a 10-year period and applied to 5% of the U.S. population, total costs for crashes alone may be as high as $93.6 billion.

Government Assistance. Although not included in the above, research further demonstrates that young adults with ADHD are eight times more likely to be receiving some form of government assistance than control children followed to adulthood contemporaneously (Gupte-Singh et al., 2017).

Total Direct and Indirect Costs

At least four studies have attempted to compute the total economic costs of ADHD in the U.S. The earliest of these followed a large sample of children with ADHD and those with comorbid conduct disorder (CD) to late adolescence. It estimated the costs for mental health, school services, and the juvenile justice system to be $40,000 per child with ADHD, or $208 billion, across that follow-up period. The cost was $80,000 per child if they also had comorbid CD (Jones & Foster, 2009). A more recent review of all economic research on ADHD as of 2012 (Doshi et al., 2012) placed the overall national annual incremental costs of ADHD in the range of $143 to $266 billion. Breaking down the costs for children only showed a range of $38–72 billion while that for adults was $105–194 billion. The largest cost for adults was lost productivity and income from work ($87–$138), while that for children was primarily health care ($21–$44 billion) followed by educational services ($15–$25 billion). The indirect costs to families was estimated nationally to be $33–$44 billion. In 2019, Daley and colleagues estimated that an adult with ADHD costs $20,000 more per year than an unaffected sibling in terms of health care costs, disability claims, and state services, or $254 billion, consistent with the range of total costs found above (Daley, Jocobsen, Lange, Sorenson, & Walldorf, 2019). Research in Israel (Ornoy & Spivak, 2019) likewise has placed the cost of each ADHD case to be nearly $290,000 USD, resulting from less education, more vehicle accidents, and a greater incidence of drug abuse.

That same study looked at the benefits of treatment in reducing costs to society. Given that the cost of treatment is $41,667 per case, comparing this against the costs of untreated ADHD results in a benefit-to-cost ratio of 7:1. In sum, society can reap up to a sevenfold reduction in the costs associated with ADHD through appropriate treatment. Earlier research in the U.S. placed the cost of treatment ADHD as being $1.8 billion per year with total health care costs of

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$12.1 billion per year, and $14.1 billion for health care costs of family members, with work loss estimated to be $3.7 billion per year (Birnbaum et al., 2006). Again, the cost of untreated ADHD far exceeds the costs associated with treatment of the disorder.

In conclusion, research to date clearly demonstrates that ADHD poses a substantial economic impact in the United States, placing between $143 to $266 billion annually. Furthermore, at least two studies have found that treating ADHD with medication can reduce its economic costs by $15,509 to $27,766 per person per quality adjusted life year (QALY) (Gilmore & Milne, 2001; Lord & Paisley, 2000). If there was ever a rationale for early and sustained interventions for ADHD for both child and adult populations, these staggering costs for the direct and indirect costs of ADHD to the U.S. would be it.

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REFERENCES

Altszuler, A. R., Page, T. F., Gnagy, E. M., Coxe, S., Arrieta, A., Molina, B. S. G., & Pelham, W. E. Jr. (2016). Financial dependence of young adults with childhood ADHD. *Journal of Abnormal Child Psychology, 44*(6), 1217–1229.

Barkley, R. A. & Cox, D. (2007). A review of driving risks and impairments associated with attention-deficit/hyperactivity disorder and the effects of stimulant medication on driving performance. *Journal of Safety Research, 38*, 1113–1128.

Barkley, R. A., Murphy, K. R., & Fischer, M. (2008). ADHD in Adults: What the Science Says. New York, NY: Guilford Publications.

Biederman, J., & Faraone, S. V. (2006). The effects of attention-deficit/hyperactivity disorder on employment and household income. Medical Genetics and Medicine, 8(3), 12.

Birnbaum, H. G., Kessler, R. C., Lowe, S. W., Secnik, K., Greenberg, P. E., Leong, S. A., & Swensen, A. R. (2006). Costs of attention deficit-hyperactivity disorder (ADHD) in the US: excess costs of person with ADHD a d their family members in 2000. *Current Medical Research and Opinions, 21* (2), P.1–P11.

Daley, D., Jocobsen, R. H., Lange, A. M., Sorenson,A., & Walldorf, J. (2019). The economic burden of adult attention deficit hyperactivity disorder: A sibling comparison cost analysis. *European Psychiatry, 61*, 41–48.

Doshi, J. A., Hodgkins, P., Kahle, J., Sikirica, V., Cangelosi, M. J., Setyawan, J., Erder M.H., & Neumann, P. J. (2012). Economic impact of childhood and adult attention-deficit/hyperactivity disorder in the United States. Journal of the American *Academy of Child and Adolescent Psychiatry, 51* (10), 990–1002.

Fletcher, J. & Wolfe, B. (2009). Long-term consequences of childhood ADHD on criminal activities. *Journal of Mental Health Policy and Economics, 12*(3), 119–138.

Gilmore, A., & Milne, R. (2001). Methylphenidate in children with hyperactivity: review and cost-utility analysis. *Pharmacoepidemiology and Drug Safety, 10*(2),85–94.

Gupte-Singh, K., Singh, R. R., & Lawson, K. A. (2017). Economic Burden of Attention-Deficit/Hyperactivity Disorder among Pediatric Patients in the United States. *Value Health, 20*(4), 602–609.

Hakkaart-van Roijen, L., Zwirs, B. W., Bouwmans, C., Tan, S. S., Schulpen, T. W. J., Vlasveld, L. & Buietelaar, J. K. (2007). Societal costs and quality of life of children suffering from attention deficient hyperactivity disorder (ADHD). *European Child and Adolescent Psychiatry, 16*(5), 316–326.

Jones, D. E. & Foster, M. (2009). Service use patterns for adolescents with ADHD and comorbid conduct disorder. *Journal of Behavioral Health Services and Research, 36*(4), 436–449.

Kessler, R. C., Lane, M., Stang, P. E., & Van Brunt, D. L. (2009). The prevalence and workplace costs of adult attention deficit hyperactivity disorder in a large manufacturing firm. *Psychological Medicine, 39*(1), 137–147.

Leibson, C. L., Katusic, S. K., Barbaresi, W. J., Ransom, J., & O'Brien, P. C. (2001). Use and costs of medical care for children and adolescents with and without attention-deficit/hyperactivity disorder. *Journal of the American Medical Association, 285*(1), 60–66.

Lord, J., & Paisley, S. (2000). The Clinical Effectiveness and Cost-Effectiveness of Methylphenidate for Hyperactivity in Childhood, Version 2. London, UK: National Institute for Clinical Excellence.

Marks, D. J., Mlodnicka, A., Bernstein, M., Chacko, A., Rose, S., & Halperin, J. M. (2009). Profiles of service utilization and the resultant economic impact in preschoolers with attention deficit/hyperactivity disorder. *Journal of Pediatric Psychology, 34*(6), 681–689.

Ornoy, A., & Spivak, A. (2019). Cost effectiveness of optimal treatment of ADHD in Israel: a suggestion for national policy. *Health Economics Review, 9*(1), 24.

Robb, J. A., Sibley, M. H., Pelham, W. E., Jr., Foster, E.M., Molina, B., Gnagy, E., Kuriyan, A. (2011). The Estimated Annual Cost of ADHD to the U.S. Education System. *School Mental Health, 3*(3), 169–177.

Sciberras, E., Lucas, N., Efron, D., Gold, L., Hiscock, H., & Nicholson, J. M. (2017). Health care costs associated with parent reported ADHD: A longitudinal Australian Population-Based Study. *Journal of Attention Disorders, 21(13)*, 1063–1072.

Secnik, K., Swensen, A. R., & Lage, M. J. (2005). Comorbidities and costs of adult patients diagnosed with Attention-Deficit Hyperactivity Disorder. *Pharmacoeconomic, 23*(1), 93–102.

Swensen, A. R., Birnbaum, H. G., Secnik, K., Marynchenko, M., Greenberg, P., Claxton, A. (2003). Attention-deficit/hyperactivity disorder: increased costs for patients and their families. *Journal of the American Academy of Child and Adolescent Psychiatry, 42*(12), 1415–1423.

Swensen, A. R., Secnik, K., Buesching, D. P., Barkley, R. A., Fischer, M., & Fletcher, K. (2001). Young adult outcome of childhood ADHD: Cost of criminal behavior. Paper presented at: Poster presented at the American Academy of Child and Adolescent Psychiatry (AACAP); October 23-28, 2001; Honolulu, HI.

Zhao, X., Page, T. F., Altszuler, A. R., Pelham, W. E., Kipp, H., Gnagy, E.. M., Coxe, S., Schatz, N. K., Merrill, B. M., Macphee, F. L., & Pelham, W. E. Jr. (2019). Economic burden of raising a child with ADHD. *Journal of Abnormal Child Psychology, 47*, 1327–1338.

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