

# *Paying Attention to the Cost of ADHD...*

*The Price Paid by Canadian Families, Governments and Society*



# **TABLE OF CONTENTS**

<b>Summary of Socioeconomic Issues and Costs</b>	<b>3</b>
<b>Summary of ASKS</b>	<b>4</b>
<b>Background</b>	<b>5</b>
<b>Health Care</b>	<b>6-7</b>
<b>Education</b>	<b>8-9</b>
<b>Crime and the Judicial System</b>	<b>10</b>
<b>Employment and the Economy</b>	<b>11</b>
<b>Conclusion</b>	<b>12</b>
<b>Bibliography</b>	<b>13-16</b>

CADDAC, a national not-for-profit organization that provides leadership in education, awareness and advocacy for Attention Deficit Hyperactivity Disorder (ADHD) organizations and individuals with ADHD across Canada, has developed this white paper to look at the socioeconomic impact of ADHD in Canada.

It is our sincere hope that this paper will not only increase the awareness and understanding of ADHD, while decreasing the stigma, but also ensure better management of ADHD within all areas of healthcare, education, work, criminal justice, and social services.

The paper has been sent to stakeholders and partners for review in June of 2013 and will be made public during ADHD Awareness Week in October (13th - 19th). Until that time this paper will be shared by CADDAC with stakeholders and professional contacts only. If you wish to share or distribute this paper more widely we ask that you contact CADDAC for permission. After October 14<sup>th</sup> 2013, this paper may be freely shared under a creative commons licence that allows for free distribution with restrictions on commercial use, modification or removal of CADDAC's name or logo.



# SUMMARY OF SOCIOECONOMIC ISSUES AND COSTS

**ADHD is not the “insignificant” disorder some imagine it to be.**

- The “cost of illness” associated with ADHD across all ages in the US is estimated to be over \$74 billion (using conservative incidence rates estimates), a potential Canadian cost of over 7 billion
- Canada loses an estimated \$6 billion to \$11 billion annually through loss of workplace productivity
- Workers with ADHD are more likely to enter the workforce as unskilled or semiskilled.

## **Health Care**

- Immediate costs of increased general medical expenses, accidents and emergency room visits
- Long-term costs of higher rates of mental health illness, substance use and abuse including alcohol and cigarettes, increased driving accidents, earlier and riskier sexual activity, increased medical costs to family members
- Diagnostic and proven treatment options can be difficult to access and be cost prohibitive.

## **Education**

- Students with ADHD are at a higher risk for lower academic achievement, grade retention, special education, disciplinary referrals and dropping out of high school
- Medication treatment alone has not shown substantial long term academic improvement
- There is a lack of educator education on ADHD and official recognition that ADHD impedes learning.

## **Justice and Corrections**

- Incidence rates of criminal activity are far greater for those with ADHD; offending begins earlier and there are higher rates of recidivism
- Treatment has been shown to reduce criminal activity
- There are no existing guidelines on screening and treating ADHD in the system.

## **Social Services**

- Those with ADHD have greater period of unemployment and are more dependent on social welfare
- Guidelines for screening of ADHD, or knowledge within the employment and social assistance services, do not exist.

**Official recognition of ADHD as an illness of significant cost to our provincial and federal governments and their Ministries is essential.**

# SUMMARY OF “ASKS”

**The Centre for ADHD Awareness, Canada, (CADDAC) requests that:**

**Health Care:** Provincial Health Ministries across Canada assess where gaps in access to assessment, diagnosis and comprehensive effective treatment options currently exist, and fund training of physician and allied health professionals to alleviate these gaps.

- Health Ministries across Canada formally recognize ADHD as a developmental and health risk

**Education:** Ministries of Education across Canada educate school boards and colleges and universities as well as educators that ADHD is a significant risk factor for poor educational outcomes and demand increased pre-service as well as in-service teacher training on ADHD.

- Education and Training, College and Universities Ministries formally recognize ADHD as a developmental and academic risk

**Justice and Corrections:** Integrate effective screening and treatment services for offenders, especially potential youth offenders. Build awareness of the effect of ADHD on the offender population in the entire criminal and justice workforce, and train them how to intercede appropriately.

- Justice and Corrections Ministries recognize ADHD as a risk to becoming involved in the justice system and continuing as repeat offenders

**Ministries of Labour and Social Services:** Recognize that ADHD can greatly reduce employment in general and job productivity when employed, and increase social assistance. Implement better screening for ADHD for those on social assistance and provide education for employers on accommodations that assist adults with ADHD overcome impairments and reach their potential.

- Ministries of Labour and employment recognize ADHD as a risk factor for unemployment and underemployment.
- Ministries of Social Service recognize that untreated ADHD can impact their costs.

**CADDAC asks that all impacted Ministries educate themselves on the role ADHD plays in their services, officially recognize ADHD for the part it plays in their Ministry's costs, find ways to implement the services required and increase interdisciplinary and inter-ministerial cooperation and ultimately reduce the huge socioeconomic costs to our society.**

# Paying Attention to the Cost of ADHD...

## The Price Paid by Canadian Families, Governments and Society

### BACKGROUND

Attention Deficit Hyperactivity Disorder (ADHD) has long been misunderstood, trivialized, stigmatized, and even denied as a disorder. Current scientific research tells us that ADHD is the most common mental health disorder amongst children worldwide, the most common behavioural referral to health care professionals, with more than half of all mental health referrals resulting in a diagnosis of ADHD<sup>1</sup>. Conservative estimates are that one in twenty children in Canada, one to two in every classroom, suffer with the symptoms of ADHD. The overall prevalence of ADHD worldwide is recorded as about 5%<sup>2</sup>. ADHD is a chronic lifelong disorder for the majority of people affected. Experts estimate that up to 60% of children with the disorder carry their symptoms into adulthood<sup>3</sup>. Again, conservatively, one in twenty-five adults in Canada will have the disorder.

Attention Deficit Hyperactivity Disorder (ADHD) impacts Canadian society well beyond its significant effect on individuals and their families. The “cost of illness” associated with ADHD across all ages in the US is estimated to be over \$74 billion (using conservative incidence rates). These translate into a potential Canadian cost of over \$7 billion. How does that compare to costs associated with other disorders? To put it in context, clinical depression is estimated to cost the United States of America (USA) \$44 billion; stroke \$53.6 billion; and substance abuse a staggering \$180 billion annually<sup>4</sup>. Canadian cost estimates are equally disturbing; Canada is believed to lose an estimated \$6 billion to \$11 billion annually through loss of workplace productivity (cost extrapolated from US statistics)<sup>5</sup>. **Clearly ADHD is not the “insignificant” disorder some imagine it to be.**

This paper examines some of the known costs of ADHD and indicates what the Canadian and provincial governments might do to reduce these significant long-term costs. Left untreated, ADHD impedes an individual’s ability to attain human and social capital and thereby impacts the Canadian economy. In contrast, if the Canadian and provincial governments invest in the provision of adequate diagnostic, treatment and effective intervention services for the prevention of additional disorders, for ADHD, substantial economic and social benefits will follow.

While abundant research tells us that the direct and indirect costs of ADHD are profound, we also know that symptoms of this disorder are very responsive to treatment<sup>6 7 8</sup>. But current lack of knowledge, skills and integration of service in the health, education, justice, employment, social service and additional sectors pose major access barriers to treatment.

#### As a first step, CADDAC requests:

- Health Ministries across Canada formally recognize ADHD as a developmental and health risk
- Education and Training, College and University Ministries formally recognize ADHD as a developmental and academic risk
- Justice and Corrections Ministries recognize ADHD as a risk to becoming involved in the justice system and continuing as repeat offenders
- Ministries of Labour and employment recognize ADHD as a risk factor for unemployment and underemployment.
- Ministries of Social Service recognize that untreated ADHD can impact their costs.

Additional proposals for changes in government policies specific to health, education, justice and employment required to facilitate essential access to effective prevention and intervention programs are detailed in the sector overviews that follow.

# HEALTH CARE

## Background

The impairing effects of the disorder, exasperated by the continuing under-diagnosis and under-treatment of ADHD, translate directly into increased healthcare costs. Some of these are immediate costs, such as the increased risk of accidents<sup>9</sup>, emergency room visits<sup>10 11</sup>, and general medical costs<sup>12 13</sup>. Others result in long-term costs for our healthcare system, such as higher rates of associated disabling disorders, including other psychiatric conditions, experienced by people with ADHD<sup>14</sup>. Above average rates of anxiety, depression and substance use disorder are diagnosed in adults who had childhood-onset ADHD, irrespective of whether they continue to meet full diagnostic criteria for ADHD in adulthood<sup>15 16</sup>.

## Substance Use and Abuse

Children with attention deficit hyperactivity disorder are up to three times more likely than other children to use, abuse, or become dependent on substances such as nicotine, cocaine and marijuana in adolescence and as young adults, according to a recent analysis of 27 long-term studies<sup>17</sup>. The research followed 4,100 ADHD and 6,800 non-ADHD children into young adulthood, in some cases for ten years or more. Additional studies indicate that childhood ADHD is also associated with alcohol use disorders later in life<sup>18</sup>. Individuals with ADHD are also at increased risk of both starting to smoke cigarettes at an early age and smoking long-term, and are twice as likely to have been prenatally exposed to nicotine<sup>19 20 21 22</sup>. Although the exact cause of these increased rates of substance abuse for those who have ADHD is not known, it is reasonable to infer that a possible cause may be an attempt to self-medicate when ADHD is not being treated. This possibility is highlighted in studies that have shown that children who received medication for their ADHD may be less likely to develop a substance abuse disorder<sup>23 24</sup>.

## Sexual Activity

Adolescents with ADHD also become sexually active earlier, have an increased rate of sexually transmitted diseases, and have a 24% to 38% rate of adolescent pregnancies compared to a 4 to 5% rate among adolescents without ADHD<sup>25 26 27</sup>.

## Driving

Adolescents and young adults with a history of ADHD as children have been shown to be at higher risk of having driving-related problems (such as accidents and tickets) for many reasons, including persistent hyperactivity-impulsivity, persistent inattention, conduct problems and irritability<sup>28</sup>. Adolescents with ADHD have four times as many serious injuries and three times as many motor vehicle accidents than those without ADHD, or than individuals with ADHD that take medication<sup>29</sup>. This higher risk of accidents, hospitalization and death results in considerable – but avoidable - costs for our health system, in addition to the high human cost paid by the individuals and their families. Experimental studies have indicated that ADHD medications used to treat ADHD improve areas of driving performance<sup>30</sup>.

## Increased Medical Costs

ADHD increases the use of health services by family members, as well as for the individual with ADHD. Studies have shown that direct and indirect medical costs were twice as high for ADHD family members than for a control group<sup>31</sup>. These increased costs were attributed to a higher incidence of mental health problems, such as depression, and to alcohol issues blamed on the increased stress experienced by individuals living with children and adults with ADHD<sup>32</sup>. One can see how ADHD can impact an entire family's functioning, potentially increasing costs to child and youth social services as well.

## Why Early and Affordable Diagnosis is Essential

The far reaching impact of ADHD makes it imperative that clinicians diagnose and treat ADHD as early as possible. The reality is that up to 90% of adults with ADHD remain untreated<sup>33</sup>. In most communities across Canada, accessing a physician to diagnose and treat adult ADHD is both difficult and costly.

Two recent CADDAC surveys<sup>34 35</sup> of adults with ADHD indicated that at least 85 % of respondents were not diagnosed as children. One of the studies<sup>34</sup> found that a third of the respondents found it difficult to obtain a diagnosis for adult ADHD. Of these, 69% reported this was due to the lack of access to a physician and 19% stated that the cost to obtain a medical assessment for ADHD from a physician impeded their search for a diagnosis. In another survey of adults with ADHD and co-existing disorders<sup>35</sup>, 58% of the respondents stated that their ADHD was first misdiagnosed as another disorder. Sixty-nine percent of respondents with co-existing disorders felt that their ADHD diagnosis was delayed due to these additional disorders, 42% indicated that the delay was due to their lack of awareness of ADHD and 36% felt the delay was caused by their physician's lack of knowledge of adult ADHD or outright disbelief that it existed.

## Comprehensive, Collaborative and Multimodal Treatment

Access to timely and comprehensive assessments and treatments for all age groups is essential to decreasing the societal and economic impact of ADHD. The Canadian ADHD Practice Guidelines<sup>36</sup> states that since ADHD impacts all aspects of an individual's daily functioning, it is essential that treatment be comprehensive, collaborative and multimodal. Presently, many proven non-medication treatments for ADHD, such as cognitive behaviour therapy (CBT)<sup>37 38</sup>, ADHD coaching<sup>39 40</sup>, parent training<sup>41 42 43</sup>, to mention just a few recommended in these guidelines, are not covered by provincial healthcare programs, making access cost prohibitive for many. This results in a two tier system of health care for ADHD. The logical conclusion is that better integrated services, combined with mandatory training on ADHD for all primary healthcare physicians<sup>44</sup> and mental health specialists, would result in faster access to thorough assessments and proper treatment. This in turn would lead to significant cost-offset in other areas of healthcare<sup>45</sup>.

## Health Care Requirements

### CADDAC requests that Provincial Health Ministries across Canada:

- Assess where gaps in access to assessment, diagnosis and comprehensive effective treatment options currently exist
- Fund training of physician and allied health professionals to alleviate these gaps.

We request that Health Ministries investigate how they can assist other Ministries (such as Education, Justice, Labour, Social Services and Child and Youth services) implement effective screening and treatment of ADHD).

**Only through education and inter-ministerial cooperation will the socioeconomic impact of ADHD on Canada be adequately addressed.**

# EDUCATION

School-aged children with ADHD can demonstrate severe impairments in the school setting. For example, compared to their peers, they are more frequently involved in off-task behavior (not working on assigned tasks); complete fewer assignments; their work is less accurate; they interfere more with their class-mates; disobey classroom rules more frequently; and are less likely to comply with teachers' requests and demands<sup>46 47 48 49</sup>. ADHD also frequently co-occurs with specific learning disabilities (LD); present in 15-40% of children with ADHD. These have a negative effect on academic outcomes<sup>50 51</sup>. However, strong evidence indicates that ADHD itself is also associated with poor educational outcomes even without an accompanying learning disorder<sup>52 53 54</sup>.

Compared to their typically-developing classmates, students with ADHD are at higher risk for lower levels of academic achievement, higher rates of disciplinary referrals, grade repetition, placement in special education, spending more years in Special Education, and dropping out of high-school<sup>55 51 65</sup>. One recent longitudinal follow-up study of boys and girls diagnosed with ADHD in childhood found that 26% of those with ADHD had repeated a grade or failed to complete high school, compared to 6.4% of peers without ADHD, even when taking into consideration other factors such as learning disorders, social class, and IQ<sup>55</sup>. Likewise, findings from another study in the US revealed that children with ADHD were 2.7 times more likely than those without ADHD to drop out of school before graduation<sup>56</sup>. Not surprisingly, students with ADHD cause their teachers and classmates substantial stress<sup>57 58</sup>.

Although some educators incorrectly believe medication will treat all ADHD impairments, research shows that medication treatment alone does not improve many of the skills required to be academically and socially successful<sup>59</sup>. While most classroom interventions focus on decreasing disruptive behavior and increasing on-task behaviour, these behaviour changes do not result in better learning and academic outcomes. It is inattention during the elementary years that predicts long-term academic impairment<sup>60</sup>. For better learning and academic outcomes to happen, specific interventions targeting learning deficits and accommodating and improving cognitive difficulties need to be implemented.<sup>61</sup>

Impairments due to ADHD do not just impact elementary and high school students. Due to an increased workload in general, as well as increased loads on attention and executive functioning, post-secondary success can prove elusive. However, studies have shown that college students with ADHD who receive proper treatment and take advantage of on-campus and community disability services can have a successful college career<sup>62</sup>.

It is concerning that studies to date have not shown strong evidence that medication treatment of ADHD alone will relieve students' impairments in the school setting or their poor educational outcomes.

A recent review of such studies concluded that medication treatment increased children's on-task behaviour and the amount of work completed by about 15%, but findings for drug effects on the accuracy of the completed work were inconsistent<sup>63</sup>. The assumption has been that these treatment-related improvements in on-task behaviour and amount of work completed will translate in the longer-term to improved academic outcomes. The limited available evidence to support this assumption is not compelling. A systematic review of studies of longer-term treatment (of at least 3 years) did not find strong evidence to support this assumption. Although long-term medication treatment was associated with improved scores on standardized achievement tests, the gains were small and of questionable educational significance; and there was little evidence of beneficial treatment effects on academic grades or grade retention<sup>64</sup>.

Currently students with ADHD result in much higher annual costs to the educational system compared to typically developing classmates<sup>65</sup>. Educational costs associated with ADHD in Canada have yet to be estimated, but data from the US indicate that the average annual incremental cost for a student with ADHD is about \$5,000 USD compared with \$318



for a typically developing student. Based upon a conservative prevalence rate of 5% for ADHD in school-aged children, and extrapolating these results to the Canadian population aged 5 to 18 years of age, the estimated annual costs associated with ADHD are \$1.5 billion to the Canadian education system. Thus the incremental lifetime cost of education for the Canadian population of children with ADHD is approximately \$19.5 billion over 13 years of education!

With estimated costs being this high, and academic outcomes still in question, it is imperative that the Canadian and provincial governments assess the effectiveness of current teaching methods for students with ADHD, and the lack of training on ADHD for educators. While funding is often cited as a barrier to providing education for teachers, a study published last year indicated that web-based platforms have shown potential as an effective and more cost-efficient tool for providing professional development on ADHD<sup>66</sup>.

## **Education Requirements**

### **CADDAC requests that Ministries of Education, Training Colleges and Universities across Canada:**

- Demand increased pre-service as well as in-service teacher training on ADHD.
- Educating school boards and post-secondary institutions, as well as educators that ADHD is a significant risk factor for poor educational outcomes is paramount. Some school boards and universities across Canada do not recognize students with ADHD as being at risk unless costly psychoeducational tests, that do not necessarily accurately report impairment and are often carried out at the parents' expense, prove this to be the case. Physicians' reports that can provide valuable insight on the child's struggles are frequently discounted.

### **We further request that all Ministries involved in education:**

- Collaborate with Health Ministries to train not only educators, but also physicians and other health care providers, on how to effectively monitor a child's school functioning to assess ADHD treatment outcomes.

# CRIME AND THE JUDICIAL SYSTEM

Studies carried out in Canada, USA, Sweden, Germany, Finland and Norway indicated that up to two-thirds of young offenders and half of adults in prisons show positive results when screened for childhood ADHD<sup>67</sup>. A U.S. study has shown that at least 25% of prisoners in the United States have ADHD<sup>68</sup>. These incidence rates are far greater than what is found in the general public. These numbers take on even more significance when we consider that people with ADHD symptoms begin offending approximately 2.5 years earlier, and have a higher rate of recidivism<sup>69</sup>.

The good news is that recent research found that criminality rates were significantly lower during times when those with the disorder were receiving ADHD medication. There was a 32% reduction in the criminality rate for men diagnosed with ADHD, and a 41% reduction for women with ADHD<sup>70</sup>. In addition, treating those with ADHD who are currently incarcerated reduces their ADHD symptoms of impulsivity, mood regulation and low frustration tolerance. Left untreated, these symptoms will negatively impact their behaviour in prison, resulting in increased rates of aggression and reduce the likelihood of early release. Untreated ADHD also makes it more difficult for inmates to take advantage of rehabilitation programs and may contribute to the continuation of any co-existing mental health disorders<sup>71</sup>.

Despite the fact that the current social and economic costs of involvement with the justice system and imprisonment are significant, (2.65 billion simply for incarceration and associated expenses in 2011- 2012 in the Correctional Service Canada report) and we know that there are effective treatments for ADHD, there are no federal guidelines on screening and treating ADHD in the prison system. If prisoners are by chance diagnosed with ADHD in prison and prescribed treatment, many cannot access a physician to continue their care on release nor can they afford the treatment they were able to obtain within the prison system.

ADHD symptoms of inattention and increased impulsivity, with the resultant reduced school performance, likely play a part in the increased rates of criminal activities. It is reasonable to conclude that implementing intervention programs that reduce the likelihood of individuals becoming involved in criminal activity, and evaluating their effectiveness of reducing these potential consequences of ADHD, short-term costs could result in long-term gains<sup>71</sup>. By screening and treating those already involved in the justice system, additional costs for recidivism and incarceration can be avoided.

## **CADDAC requests that Ministries of Justice and Corrections across Canada:**

- Recognize that ADHD greatly increases the risk of becoming involved with the justice system.

We further ask that Education, Health, Justice and Correction Ministries:

- Work together to find cost effective ways to integrate more effective screening and treatment services for offenders, especially potential youth offenders.
- Build awareness of the effect of ADHD on the offender population in the entire criminal and justice workforce, and training them on how to intercede, will help to maximize the success of rehabilitation and reduce recidivism<sup>71</sup>.

# EMPLOYMENT AND THE ECONOMY

Some adults with ADHD are high functioning and financially successful. However, in general, untreated ADHD impedes the attainment of human and social capital, resulting in major socioeconomic costs for the Canadian government. Research found that individuals with ADHD are more likely to enter the workforce at the unskilled or semi-skilled level; have greater periods of unemployment; are more likely to be dismissed; change jobs more frequently; and earn considerable less money over their lifetime. Many drift from one lower-paying job to another, have a higher than average dependency on social welfare, and subsequently contribute less taxes. The economic and social costs associated with high-school dropout rates, underemployment<sup>72 73</sup>, and unemployment<sup>74</sup>, are staggering; the loss incurred for each high school dropout is estimated at approximately US\$399,000 across a lifetime<sup>75</sup>. Canada (and Canadians) pays a high price for this tragic under-use of human capital.

While ADHD symptoms show differently in adults than in children, the problems with organizational tasks and distractibility remain. These can lead to poor job performance and higher numbers of days absent compared to peers without ADHD, and result in lower occupational status and less job satisfaction<sup>76 77 78</sup>. A recent working paper (February 2013) expands on this research, suggesting that, in the US, childhood ADHD reduces employment in adulthood between 10 to 14 percentage points, cuts earnings by 33% and increases social assistance by 15 percentage points. This paper points out that these effect sizes may be this large because the adults in this study grew up in a time when treatments were not very accessible<sup>79</sup>. Another 2013 study recommends placing increased focus on the earlier diagnosis of adolescent ADHD because it is such a strong predictor of mental and physical health problems, workplace impairment and financial issues<sup>80</sup>.

In a self-reported adult ADHD survey<sup>34</sup> conducted by CADDAC, 79% reported that a lack of access to treatment had a negative effect on a variety of areas in their work and financial lives, such as: lower job productivity (67%); inability to receive promotions (50%); inability to completed desired education (47%); inability to keep a job (32%); and financial difficulties (70%). An additional CADDAC study<sup>35</sup> showed missed work days significantly decrease after treatment was initiated. Of those surveyed, 68% reported not receiving school accommodations as an adult and 90% reported not receiving workplace accommodations.

If we review the costs to our economy of the well-documented reduced capital attainment and decreased workplace performance, and couple this with the knowledge that access to adult ADHD assessment and comprehensive follow-up treatment in particular in Canada is both difficult and, for many, impossible to afford, it is clear that investing in better medical services for ADHD across the lifespan would have a significant positive impact on our economy.

## **CADDAC requests that Ministries of Labour, Training Colleges and Universities, Education, Health and Social Services across Canada:**

- Recognize that ADHD can greatly increase school dropout rates, thereby decreasing occupational status, reduce employment in general and job productivity when employed, and increase social assistance.
- Evaluate the socioeconomic impact of continued lack of health and educational services for these individuals.
- Work together to implement better screening for ADHD for those on social assistance and provide education for postsecondary institutions and employers on accommodations that assist adults with ADHD overcome impairments and reach their potential.

# CONCLUSION

ADHD is a unique disorder with multifaceted consequences for individuals with the disorder. However, more importantly for the purposes of this paper, ADHD's cost of illness is significant and impacts many aspects of the Canadian economy.

- ADHD costs us billions of dollars each year in lost productivity.
- ADHD directly increases health care and education costs at all levels, as well as costs to justice and corrections.
- ADHD increases costs to social services and labour through increased costs to welfare, disability and unemployment.
- In addition, ministries such as Child and Youth Services can also be impacted due to increased family stress and conflict.

While this paper does not include all the costs associated with ADHD, it clearly demonstrates that ADHD has a serious impact on many of our Ministries' costs.

Official recognition of ADHD as an illness of significant cost to our provincial and federal governments and their Ministries is essential. Additional Ministries, such as Labour, Justice and social services departments must also recognize that ADHD impacts their service costs. Implementing comprehensive screening throughout these areas, working with the Ministry of Health to implement effective assessment and treatment procedures, as well as training their own work force to recognize ADHD as a risk factor, is not only overdue, it also makes economic and social sense.

**In conclusion, CADDAC requests that all impacted Ministries:**

- Educate themselves on the role ADHD plays in their services
- Officially recognize ADHD for the part it plays in their Ministry's costs
- Find ways to implement the services required, and
- Increase interdisciplinary and inter-ministerial cooperation and ultimately reduce the huge socioeconomic costs to our society.

# BIBLIOGRAPHY

---

- <sup>1</sup> Currie J, Stabile M. Child mental health and human capital accumulation: the case of ADHD. *J Health Econ.* 2006 Nov;25(6):1094-118.
- <sup>2</sup> Polanczyk G, de Lima MS, Horta BL, Biederman J, Rohde LA. The worldwide prevalence of ADHD: a systematic review and meta-regression analysis. *Am J Psychiatry.* 2007 Jun;164(6):942-8.
- <sup>3</sup> Kessler, R.C., et al., Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry.* 2005. 62(6): p. 593-602.
- <sup>4</sup> Pelham WE, Foster EM, Robb JA. The economic impact of attention-deficit/hyperactivity disorder in children and adolescents. *J Pediatr Psychol.* 2007 Jul;32(6):711-27.
- <sup>5</sup> Biederman J, Faraone SV. The effects of attention-deficit/hyperactivity disorder on employment and household income. *MedGenMed.* 2006 Jul 18;8(3):12.
- <sup>6</sup> Foster EM et al., Treatment for ADHD: is more complex treatment cost-effective for more complex cases? *Health Serv. Res.* 2007 Feb;42(1 Pt 1):165-82
- <sup>7</sup> Jensen PS et al, Cost-effectiveness of ADHD treatments: findings from the multimodal treatment study of children with ADHD. *Am J Psychiatry.* 2005 Sep;162(9):1628-36.
- <sup>8</sup> Marchetti A et al, Pharmacotherapies for attention-deficit/hyperactivity disorder: expected-cost analysis. *Clin. Ther.* 2001 Nov;23(11):1904-21.
- <sup>9</sup> Swensen A et al, Incidence and costs of accidents among attention-deficit/hyperactivity disorder patients. *J Adolesc Health.* 2004 Oct;35(4):346.e1-9.
- <sup>10</sup> Leibson CL et al, Use and costs of medical care for children and adolescents with and without attention-deficit/hyperactivity disorder. *JAMA.* 2001 Jan 3;285(1):60-6.
- <sup>11</sup> Biederman J, Wilens TE, Mick E, Faraone SV, Spencer T., Does attention-deficit hyperactivity disorder impact the developmental course of drug and alcohol abuse and dependence? *Biol Psychiatry.* 1998 Aug 15;44(4):269-73.
- <sup>12</sup> Swensen AR et al, Attention-deficit/hyperactivity disorder: increased costs for patients and their families. *J Am Acad Child Adolesc Psychiatry.* 2003 Dec;42(12):1415-23.
- <sup>13</sup> Guevara J, Lozano P, Wickizer T, Mell L, Gephart H, Utilization and cost of health care services for children with attention-deficit/hyperactivity disorder. *Pediatrics.* 2001 Jul;108(1):71-8.
- <sup>14</sup> Wilens TE, Biederman J, Mick E. Does ADHD affect the course of substance abuse? Findings from a sample of adults with and without ADHD. *Am J Addict.* 1998 Spring;7(2):156-63. PMID: 9598219
- <sup>15</sup> Barkley RA, Murphy KR, Fischer M. *ADHD in Adults: What the Science Says*, New York Guilford Press, 2008
- <sup>16</sup> Barbaresi WJ, Colligan RC, Weaver AL, Voigt RG, Killian JM, Katusic SK. Mortality, ADHD, and Psychosocial Adversity in Adults With Childhood ADHD: A Prospective Study. *Pediatrics.* 2013 Mar 4.
- <sup>17</sup> Lee SS., Childhood ADHD increases the risk of nicotine use in adolescence and alcohol use in young adulthood. *Evid Based Ment Health.* 2011 Aug;14(3):63
- <sup>18</sup> Charach A, Yeung E, Climans T, Lillie E. Childhood attention-deficit/hyperactivity disorder and future substance use disorders: comparative meta-analyses. *J Am Acad Child Adolesc Psychiatry.* 2011 Jan;50(1):9-21. doi: 10.1016/j.jaac.2010.09.019.
- <sup>19</sup> Pomerleau OF, Downey KK, Stelson FW, Pomerleau CS, Cigarette smoking in adult patients diagnosed with attention deficit hyperactivity disorder. *J Subst Abuse.* 1995;7(3):373-8.
- <sup>20</sup> Linnet KM et al, Maternal lifestyle factors in pregnancy risk of attention deficit hyperactivity disorder and associated behaviors: review of the current evidence. *Am J Psychiatry.* 2003 Jun;160(6):1028-40.
- <sup>21</sup> Vuijk P, van Lier PA, Huizink AC, Verhulst FC, Crijnen AA, Prenatal smoking predicts non-responsiveness to an intervention targeting attention-deficit/hyperactivity symptoms in elementary schoolchildren. *J Child Psychol Psychiatry.* 2006 Sep;47(9):891-901.
- <sup>22</sup> Yolton K, Dietrich K, Auinger P, Lanphear BP, Hornung R, Exposure to environmental tobacco smoke and cognitive abilities among U.S. children and adolescents. *Environ Health Perspect.* 2005 Jan;113(1):98-103.
- <sup>23</sup> Biederman J, et al, Pharmacology of attention-deficit/hyperactivity disorder reduces risk for substance abuse disorder. *Pediatric* 104(2) :e20,1999
- <sup>24</sup> Willens TE, Faraone SV, Biederman J, Gunawardene S. Does stimulant therapy of attention-deficit/hyperactivity disorder beget later substance abuse? A meta-analytic review of the literature. *pediatrics*, 2003,111:179-185.
- <sup>25</sup> Barkley, R. A., Murphy, K. R., & Fischer, M. (2008). *ADHD in adults: What the Science Says*. New York: Guilford.

- 
- <sup>26</sup> Barkley RA, Fischer M, Smallish L, Fletcher K, Young adult outcome of hyperactive children: adaptive functioning in major life activities. *J Am Acad Child Adolesc Psychiatry*. 2006 Feb;45(2):192-202.
- <sup>27</sup> Flory K et al, Childhood ADHD predicts risky sexual behavior in young adulthood. *J Clin Child Adolesc Psychol*. 2006 Dec;35(4):571-7.
- <sup>28</sup> Thompson AL, Molina BS, Pelham W Jr, Gnagy EM, Risky driving in adolescents and young adults with childhood ADHD. *J Pediatr Psychol*. 2007 Aug;32(7):745-59.
- <sup>29</sup> Barkley RA et al. Driving-related risks and outcomes of attention deficit hyperactivity disorder in adolescents and young adults: a 3- to 5-year follow-up survey. *Pediatrics*. 1993 Aug;92(2):212-8.
- <sup>30</sup> Jerome L, Segal A, Habinski L. What we know about ADHD and driving risk: a literature review, meta-analysis and critique. *J Can Acad Child Adolesc Psychiatry*. 2006 Aug;15(3):105-25.
- <sup>31</sup> Swensen AR, Birnbaum HG, Secnik K, et al. Attention-deficit/hyperactivity disorder: increased costs for patients and their families. *J Am Acad Child Adolesc Psychiatry* 2003;42:1415–23.
- <sup>32</sup> V A Harpin. The effect of ADHD on the life of an individual, their family, and community from preschool to adult life. *Arch Dis Child* 2005;90:i2-i7 doi:10.1136/adc.2004.059006.
- <sup>33</sup> Kessler RC, Adler L, Barkley R, et al. The prevalence and correlates of adult ADHD in the United States: results from the National Comorbidity Survey Replication. *Am J Psychiatry*. 2006;163(4):716–723.
- <sup>34</sup> CADDAC ADHD Adults Survey 2012
- <sup>35</sup> CADDAC ADHD Comorbidity Survey 2013
- <sup>36</sup> Canadian Attention Deficit Hyperactivity Disorder Resource Alliance (CADDRA): Canadian ADHD Practice Guidelines, Third Edition, Toronto ON; CADDRA, 2011.
- <sup>37</sup> Virta M, Salakari A, Antila M, Chydenius E, Partinen M, Kaski M, et al. Short cognitive behavioral therapy and cognitive training for adults with ADHD - a randomized controlled pilot study. *Neuropsychiatric Disease & Treatment* [Internet]. 2010 [cited 2011 Mar 29];6:443-53.
- <sup>38</sup> Safren SA, Otto, MW, Sprich S, et al. Cognitive-behavioural therapy for ADHD in medication-treated adults with continued symptoms. *Behavior Research and Therapy*, 2005;43:831
- <sup>39</sup> Kubik JA. Efficacy of ADHD coaching for adults with ADHD. *J Atten Disord*. 2010 Mar;13(5):442-53. doi: 10.1177/1087054708329960.
- <sup>40</sup> Sharon Field et al. Quantifying the Effectiveness of Coaching for College Students with Attention Deficit/Hyperactivity Disorder. College of Education, Wayne State University, Detroit, MI. August 31, 2010.
- <sup>41</sup> Power TJ et al. A family-school intervention for children with ADHD: results of a randomized clinical trial. *J Consult Clin Psychol*. 2012 Aug;80(4):611-23. doi: 10.1037/a0028188.
- <sup>42</sup> Ostberg M, Rydell AM. An efficacy study of a combined parent and teacher management training programme for children with ADHD. *Nord J Psychiatry*. 2012 Apr;66(2):123-30. doi: 10.3109/08039488.2011.641587.
- <sup>43</sup> Piffner LJ et al. Educational outcomes of a collaborative school-home behavioral intervention for ADHD. *Sch Psychol Q*. 2013 Mar;28(1):25-36. doi: 10.1037/spq000016.
- <sup>44</sup> Culpepper L, Mattingly G. Challenges in identifying and managing attention-deficit/hyperactivity disorder in adults in the primary care setting: a review of the literature. *Prim Care Companion J Clin Psychiatry*. 2010;12(6). pii: PCC.10r00951. doi: 10.4088/PCC.10r00951pur.
- <sup>45</sup> Secnik K, Swensen A, Lage MJ, Comorbidities and costs of adult patients diagnosed with attention-deficit hyperactivity disorder. *Pharmacoeconomics*. 2005;23(1):93-102.
- <sup>46</sup> Abikoff HB et al. Observed classroom behavior of children with ADHD: relationship to gender and comorbidity. *J Abnorm Child Psychol*. 2002 Aug;30(4):349-59.
- <sup>47</sup> Kofler MJ, Rapport MD, Alderson RM. Quantifying ADHD classroom inattentiveness, its moderators, and variability: a meta-analytic review. *J Child Psychol Psychiatry*. 2008 Jan;49(1):59-69. doi: 10.1111/j.1469-7610.2007.01809.x. Review.
- <sup>48</sup> Lauth GW, Heubeck BG, Mackowiak K. Observation of children with attention-deficit hyperactivity (ADHD) problems in three natural classroom contexts. *Br J Educ Psychol*. 2006 Jun;76(Pt 2):385-404.
- <sup>49</sup> Rapport MD, Kofler MJ, Alderson RM, Timko TM Jr, Dupaul GJ. Variability of attention processes in ADHD: observations from the classroom. *J Atten Disord*. 2009 May;12(6):563-73. doi: 10.1177/1087054708322990.
- <sup>50</sup> Gerber PJ. The impact of learning disabilities on adulthood: a review of the evidenced-based literature for research and practice in adult education. *J Learn Disabil*. 2012 Jan-Feb;45(1):31-46. doi: 10.1177/0022219411426858.
- <sup>51</sup> McLaughlin MJ, Speirs KE, Shenassa ED. Reading Disability and Adult Attained Education and Income: Evidence From a 30-Year Longitudinal Study of a Population-Based Sample. *J Learn Disabil*. 2012 Sep 14.

- 
- <sup>52</sup> Currie, Janet & Stabile, Mark, 2006. "Child mental health and human capital accumulation: The case of ADHD," *Journal of Health Economics*, Elsevier, vol. 25(6), pages 1094-1118, November.
- <sup>53</sup> Fletcher J, Wolfe B. Child mental health and human capital accumulation: the case of ADHD revisited. *J Health Econ*. 2008 May;27(3):794-800. doi: 10.1016/j.jhealeco.2007.10.010.
- <sup>54</sup> Frazier TW et al. ADHD and achievement: meta-analysis of the child, adolescent, and adult literatures and a concomitant study with college students. *J Learn Disabil*. 2007 Jan-Feb;40(1):49-65.
- <sup>55</sup> Fried R, Petty C, Faraone SV, Hyder LL, Day H, Biederman J. Is ADHD a Risk Factor for High School Dropout? A Controlled Study. *J Atten Disord*. 2013 Feb 4.
- <sup>56</sup> Barbaresi WJ, Katusic SK, Colligan RC, Weaver AL, Jacobsen SJ. Long-term school outcomes for children with attention-deficit/hyperactivity disorder: a population-based perspective. *J Dev Behav Pediatr*. 2007 Aug;28(4):265-73.
- <sup>57</sup> Bussing R et al. ADHD and conduct disorder: an MRI study in a community sample. *World J Biol Psychiatry*. 2002 Oct;3(4):216-20.
- <sup>58</sup> Greene R W et al. Are Students with ADHD More Stressful to Teach? Patterns of Teacher Stress in an Elementary School Sample. *Journal of Emotional and Behavioral Disorders Summer 2002* vol. 10 no. 2 79-89
- <sup>59</sup> The MTA Cooperative Group (1999). A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. The MTA Cooperative Group. Multimodal Treatment Study of Children with ADHD. *Archives of General Psychiatry*, 56, 1073-1086.
- <sup>60</sup> Pingault JB et al. Childhood trajectories of inattention and hyperactivity and prediction of educational attainment in early adulthood: a 16-year longitudinal population-based study. *Am J Psychiatry*. 2011 Nov;168(11):1164-70. doi: 10.1176/appi.ajp.2011.10121732.
- <sup>61</sup> Martinussen R, Tannock R, with McInnes A, Chaban P (2006). *TeachADHD Teacher's Resource Manual* (DVD enclosed; Website: [www.teachADHD.ca](http://www.teachADHD.ca)). TVOntario, Toronto, Canada [[www.tvontario.org/sales/teachadhd](http://www.tvontario.org/sales/teachadhd)]
- <sup>62</sup> Culpepper L. Prevalence and impact of ADHD in college students. *J Clin Psychiatry*. 2011 Sep;72(9):e30. doi: 10.4088/JCP.11009tx1c.
- <sup>63</sup> Prasad V et al. How effective are drug treatments for children with ADHD at improving on-task behaviour and academic achievement in the school classroom? A systematic review and meta-analysis. *Eur Child Adolesc Psychiatry*. 2013 Apr;22(4):203-16. doi: 10.1007/s00787-012-0346-x.
- <sup>64</sup> Langberg JM, Becker SP. Does long-term medication use improve the academic outcomes of youth with attention-deficit/hyperactivity disorder? *Clin Child Fam Psychol Rev*. 2012 Sep;15(3):215-33. doi: 10.1007/s10567-012-0117-8. Review.
- <sup>65</sup> Robb J A, Sibley M H, Pelham Jr W E et al. The Estimated Annual Cost of ADHD to the US Education System. *School Mental Health*, September 2011, Volume 3, Issue 3, pp 169-177.
- <sup>66</sup> Barnett B, Corkum P, Elik N (2012). A web-based intervention for elementary school teachers of students with attention-deficit hyperactivity disorder (ADHD). *Psychological Services* 9(2): 227-230
- <sup>67</sup> Young S, Adamou M, Bolea B, Gugjonsson G, Muller U, Pitts M, Thorne J, Asherton P: The identification and management of ADHD offenders within the criminal justice system: a consensus statement from the UK Adult ADHD Network and criminal justice agencies. *BMC Psychiatry* 2011, 11:31
- <sup>68</sup> Eme R. Attention-deficit hyperactivity disorder and correctional health care. *J Correctional Health Care*. 2009;15:5-18.
- <sup>69</sup> Young S, Wells J, Gugjonsson G: Predictors of offending among prisoners: the role of Attention Deficit Hyperactivity Disorder (ADHD) and substance use. *Journal of Psychopharmacology*, published online 17 June 2010
- <sup>70</sup> Medication for Attention Deficit–Hyperactivity Disorder and Criminality. Paul Lichtenstein, Ph.D., Linda Halldner, M.D., Ph.D., Johan Zetterqvist, M.Ed., Arvid Sjölander, Ph.D., Eva Serlachius, M.D., Ph.D., Seena Fazel, M.B., Ch.B., M.D., Niklas Långström, M.D., Ph.D., and Henrik Larsson, M.D., Ph.D. *N Engl J Med* 2012; 367:2006-2014 November 22, 2012 DOI: 10.1056/NEJMoa1203241
- <sup>71</sup> Fletcher J, Wolfe B. Long-term consequences of childhood ADHD on criminal activities. *J Ment Health Policy Econ*. 2009 Sep;12(3):119-38.
- <sup>72</sup> Biederman J, Faraone SV, The effects of attention-deficit/hyperactivity disorder on employment and household income. *MedGenMed*. 2006 Jul 18;8(3):12.
- <sup>73</sup> Kessler RC et al, The prevalence and effects of adult attention deficit/hyperactivity disorder on work performance in a nationally representative sample of workers. *J Occup Environ Med*. 2005 Jun;47(6):565-72.
- <sup>74</sup> Mannuzza S, Klein RG, Bessler A, Malloy P, Hynes ME, Educational and occupational outcome of hyperactive boys grown up. *J Am Acad Child Adolesc Psychiatry*. 1997 Sep;36(9):1222-7.

- 
- <sup>75</sup> Cohen, M. (1998). *Journal of Quantitative Criminology*, 14(1), p. 5. The monetary value of saving a high-risk youth.
- <sup>76</sup> Mannuzza S, Klein RG, Review. Long-term prognosis in attention-deficit/hyperactivity disorder. *Child Adolesc Psychiatr Clin N Am*. 2000 Jul;9(3):711-26.
- <sup>77</sup> Murphy K, Barkley RA, Attention deficit hyperactivity disorder adults: comorbidities and adaptive impairments. *Compr Psychiatry*. 1996 Nov-Dec;37(6):393-401.
- <sup>78</sup> Secnik K, Swensen A, Lage MJ, Comorbidities and costs of adult patients diagnosed with attention-deficit hyperactivity disorder. *Pharmacoeconomics*. 2005;23(1):93-102.
- <sup>79</sup> Fletcher JM. The Effects of Childhood ADHD on Adult Labor Market Outcomes. *Health Econ*. 2013 Feb 21. doi: 10.1002/hec.2907.
- <sup>80</sup> Brook JS, Brook DW, Zhang C, Seltzer N, Finch SJ. Adolescent ADHD and adult physical and mental health, work performance, and financial stress. *Pediatrics*. 2013 Jan;131(1):5-13. doi: 10.1542/peds.2012-1725.