

The global burden of conduct disorder and attention-deficit/hyperactivity disorder in 2010

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Objective: The Global Burden of Disease Study 2010 (GBD 2010) is the first to include conduct disorder (CD) and attention-deficit/hyperactivity disorder (ADHD) for burden quantification. **Method:** A previous systematic review pooled the available epidemiological data for CD and ADHD, and predicted prevalence by country, region, age and sex for each disorder. Prevalence was then multiplied by a disability weight to calculate years lived with disability (YLDs). As no evidence of deaths resulting directly from either CD or ADHD was found, no years of life lost (YLLs) were calculated. Therefore, the number of disability-adjusted life years (DALYs) was equal to that of YLDs. **Results:** Globally, CD was responsible for 5.75 million YLDs/DALYs with ADHD responsible for a further 491,500. Collectively, CD and ADHD accounted for 0.80% of total global YLDs and 0.25% of total global DALYs. In terms of global DALYs, CD was the 72nd leading contributor and among the 15 leading causes in children aged 5–19 years. Between 1990 and 2010, global DALYs attributable to CD and ADHD remained stable after accounting for population growth and ageing. **Conclusions:** The global burden of CD and ADHD is significant, particularly in male children. Appropriate allocation of resources to address the high morbidity associated with CD and ADHD is necessary to reduce global burden. However, burden estimation was limited by data lacking for all four epidemiological parameters and by methodological challenges in quantifying disability. Future studies need to address these limitations in order to increase the accuracy of burden quantification. **Keywords:** Global burden of disease study 2010, conduct disorder, attention-deficit/hyperactivity disorder, disability-adjusted life year, years lived with disability.

Introduction

For the first time in the global burden of disease calculations, the Global Burden of Disease Study 2010 (GBD 2010) has included conduct disorder (CD) and attention-deficit/hyperactivity disorder (ADHD) in its scope. Previous research has found that both disorders are associated with a range of adverse outcomes including higher rates of injury (Rowe, Maughan, & Goodman, 2004; Schwebel, Speltz, Jones, & Bardina, 2002), increased numbers of vehicular accidents (Jerome, Habinski, & Segal, 2006) and poor educational outcomes (Loe & Feldman, 2007). Furthermore, a diagnosis of CD and/or ADHD significantly increases the risk of substance abuse (Disney, Elkins, McGue, & Iacono, 1999), criminal activity (Babinski, Hartsough, & Lambert, 1999; Lichtenstein et al., 2012) and other mental disorders (Drabick, Gadow, & Sprafkin, 2006). Their inclusion represents a watershed moment in the global recognition of these disorders. Previous GBD studies, GBD 1990 (Murray & Lopez, 1996) and the 2000–2005 updates (World Health Organization,

2008) identified mental disorders as a significant contributor to global disease burden that warranted the same amount of consideration in health management plans as other noncommunicable diseases (Prince et al., 2007). That said, these studies omitted the burden of CD and ADHD. Given that 27% of the world's population are aged under 15 years with a further 17% aged under 25 years (United Nations, 2011), the inclusion of CD and ADHD in GBD 2010 allows us to compute more accurate calculations of the burden of mental disorders across the entire life span.

GBD 2010 quantified burden for 291 diseases, injuries and risks across 187 countries and 21 world regions, for males and females in 1990, 2005 and 2010. This encompassed 13 mental disorders, including CD and ADHD, which were further aggregated into nine mental disorder groups with CD and ADHD being known collectively as 'childhood behavioural disorders' (Murray, Ezzati et al., 2012). Burden quantification involves the calculation of years lived with disability (YLDs) as well as years of life lost due to premature mortality (YLLs). Both measures are summed to give disability-adjusted life years (DALYs) as a final measure of burden, where one DALY equals one year of healthy life lost. Thus, the DALY takes into account both fatal and nonfatal burden. As no

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mortality was assigned to CD or ADHD as a direct cause, the number of YLDs equalled the number of DALYs for each disorder. YLDs/DALYs were calculated for males and females, for 1990, 2005 and 2010, for separate age groups and across 187 countries and 21 world regions. Our study is preceded by the GBD 2010 capstone papers, which reported the methodology and main findings of the study (Lim et al., 2012; Lozano et al., 2012; Murray, Vos et al., 2012; Salomon, Vos et al., 2012; Salomon, Wang et al., 2012; Vos et al., 2012; Wang et al., 2012). In our study, we report the individual burden presented by CD and ADHD. We describe the methodology for producing YLDs/DALYs and analyse trends in burden across age, sex, year and region. Finally, we discuss how burden calculations for CD and ADHD could be improved in future iterations of GBD.

Methods

Case definition

Both the Diagnostic and Statistical Manual of Mental Disorders (DSM) and International Classification of Diseases (ICD) describe ADHD ('hyperkinetic disorder' in ICD) as a disruptive disorder characterized by persistent hyperactivity-impulsivity and/or inattention (DSM-IV-TR: 314.00, 314.01 (American Psychiatric Association, 2000); ICD-10: F90 (World Health Organization, 1992)). According to these criteria, a case must first occur before the age of 7 (American Psychiatric Association, 2000; World Health Organization, 1992). CD is characterized by a persistent pattern of antisocial behaviour that violates major age-appropriate societal norms or the basic rights of others (DSM-IV-TR: 312.81, 312.82, 312.89 (American Psychiatric Association, 2000); ICD-10: F91 (World Health Organization, 1992)). It is diagnosed in children under the age of 18 whose behaviour is a result of inherent pathology, rather a valid reaction to hostile circumstances (Wakefield, Pottick, & Kirk, 2002). Although CD can also be diagnosed in adults who display antisocial behaviours but do not meet the criteria for antisocial personality disorder (ASPD), very few studies investigate CD in adulthood as they tend instead to measure adult antisocial behaviour (Ebejer et al., 2012; Milne et al., 2009; Rowe, Costello, Angold, Copeland, & Maughan, 2010) or focus only on children. Furthermore, no adult personality disorders (inclusive of ASPD) were included in GBD 2010 due to a dearth of epidemiological data (University of New South Wales, 2009). As such, only CD occurring in childhood was included in GBD 2010.

Calculation of YLDs/DALYs

For GBD 2010, the calculation of YLDs/DALYs involved the synthesis of epidemiological data and estimations of disease disability as described below.

Epidemiological inputs. A systematic review of the literature capturing estimates of prevalence, incidence, remission and excess mortality for CD and ADHD has been previously reported (Erskine et al., 2013). Briefly, electronic databases including Medline, PsycInfo and EMBASE were searched and studies were included if they reported epidemiological estimates (i.e. prevalence, incidence, remission and/or excess mortality) from 1980 onwards; were representative of the country, region or community in question; and utilized DSM or ICD diagnostic criteria. For prevalence, only point or past

year estimates were accepted due to the risk of recall bias presented by lifetime estimates (Moffitt et al., 2010; Simon & VonKorff, 1995; Susser & Shrout, 2010). Only annual incidence rates were accepted while mortality estimates had to be in the form of standardized mortality ratios (SMRs) or relative risk (RR). The findings of the systematic reviews conducted for CD and ADHD are summarized in Table 1.

Disease modelling. All epidemiological data sourced from the systematic reviews were entered into and aggregated in a Bayesian metaregression tool designed specifically for GBD 2010, DisMod-MR (Vos et al., 2012). This tool is able to impose internal consistency between estimates of prevalence, incidence, remission and mortality via a mathematical model (Barendregt, Van Oortmarssen, Vos, & Murray, 2003); utilize both study-level and country-level covariates to deal with the different sources of variability in the data; and calculate uncertainty around both the raw data and the final output (Vos et al., 2012). Furthermore, estimates can be predicted for regions where no raw data are available by using random effects on country, region and super-region. In GBD 2010, the 21 world regions were grouped into eight super-regions. The global average and country-level covariates can also be used as the basis for predictions when an entire super-region has no available data. As such, DisMod-MR generated prevalence estimates for all 187 countries and 21 world regions, males and females, three time periods (1990, 2005 and 2010) and separate age groups. These prevalence estimates were then used in the calculation of YLDs. The key estimations made by DisMod-MR for CD and ADHD are summarized in Table 1, while the modelling process and more detailed results have been previously reported (Erskine et al., 2013).

Disability weights. GBD 2010 defined disability as any short- or long-term health loss due to a particular disease. Disability weights were estimated through an open-access internet survey available in multiple languages ($n = 16,328$) and population surveys conducted in USA, Bangladesh, Indonesia, Peru and Tanzania ($n = 13,902$) with these countries chosen to ensure a diverse range of cultures, languages and socioeconomic status were represented (Salomon, Vos et al., 2012). Each survey contained 220 lay descriptions of health states which covered all the diseases and injuries included in GBD 2010. These descriptions were restricted to 35 words or less in length and were required to use simple, nonclinical vocabulary to ensure they could be understood by lay participants (Salomon, Vos et al., 2012). The lay descriptions were then presented as paired-comparison questions where participants were asked to choose which of the two conditions they deemed more 'unhealthy'. To derive disability weights, responses were fixed on a 0 (healthy) to 1 (death) scale (Salomon, Vos et al., 2012). Salomon, Vos et al. (2012) found that disability weights maintained a high degree of consistency across the two types of surveys and between the different countries captured in both the internet and population surveys. The disability weights for ADHD and CD are shown in Table 1 along with their respective lay descriptions which were composed by the GBD Mental Disorders Expert Group.

Adjustment for proportion of time symptomatic. These disability weights were adjusted to reflect time symptomatic based on survey data sourced from the Great Smoky Mountains Study (GSMS) (Costello et al., 1996), which assessed the levels of disability found in children and adolescents with mental disorders (Ezpeleta, Keeler, Erkanli, Costello, & Angold, 2001). Disability was measured across three domains (family, education and peer relationships) using the Child and Adolescent Psychiatric Assessment (CAPA) (Angold & Costello, 2000). Seventy-two per cent of those with CD and 48% of those with

Table 1 Inputs used in the calculation of years lived with disability (YLDs) for CD and ADHD

Input	CD	ADHD	Source
Epidemiological data			
Total number of estimates (number of studies in brackets)	67 (30)	85 (54)	Systematic literature review (Erskine et al., 2013)
Prevalence	56 (25)	75 (44)	
Incidence	5 (3)	0	
Remission	6 (5)	10 (10)	
Excess mortality	0	0	
Number of regions with available data (of the 21 regions)	10	11	
Disease modelling prevalence input (%)			
Global	0.71 (0.66–0.75)	0.53 (0.50–0.56)	Epidemiological modelling (Erskine et al., 2013)
Regional range			
Lowest	0.41 (0.35–0.46)	0.31 (0.27–0.35)	
	Europe Western	Europe Eastern	
Highest	1.06 (0.88–1.28)	0.79 (0.59–1.04)	
	Sub-Saharan Africa Central	Oceania	
Ages 5–19 years			
Males	3.65 (3.33–3.96)	2.16 (2.01–2.31)	
Females	1.53 (1.42–1.67)	0.66 (0.62–0.71)	
Disability weights			
Lay descriptions	'has frequent behaviour problems, which are sometimes violent. The person often has difficulty interacting with other people and feels irritable.'	'is hyperactive and has difficulty concentrating, remembering things, and completing tasks.'	GBD 2010 disability weight survey (Salomon, Vos et al., 2012)
Unadjusted	0.236 (0.154–0.337)	0.049 (0.031–0.074)	Proportions taken from the GSMS (Ezpeleta et al., 2001)
Time symptomatic	52%	28%	
Adjusted	0.123 (0.072–0.189)	0.014 (0.008–0.022)	

ADHD reported disability, whereas 20% of those with no diagnosis reported disability at the time of survey (Ezpeleta et al., 2001). Using these as estimates of the proportion of time with disability in the 'average case', we subtracted the proportion of disability in children without a diagnosis from the proportion with disability for both disorders, giving adjusted proportions of 52% and 28% for CD and ADHD respectively. As no uncertainty was specified in the study, a range of 25% either side of the estimate was applied. The aforementioned disability weights from the GBD 2010 disability weights survey (Salomon, Vos et al., 2012) were then multiplied by these disability proportions. The disability proportions and adjusted disability weights are shown in Table 1. Microsimulations were then used to correct for comorbidity in YLDs by creating hypothetical populations and estimating the probability of having multiple conditions (Murray, Ezzati et al., 2012; Vos et al., 2012).

Results

Overview

The combined overall global burden of CD and ADHD across gender and age in 2010 was 6.24 million YLDs/DALYs (YLDs: years lived with disability; DALYs: disability-adjusted life years), with CD responsible for 5.75 million and ADHD contributing 491,500 YLDs/DALYs respectively. CD and ADHD combined accounted for 0.25% (95% uncertainty: 0.16–0.37) of the total 2.49 billion all-cause global DALYs (CD: 0.23%, 0.14–0.34; ADHD: 0.02%, 0.01–0.03). In terms of YLDs, CD and ADHD were responsible for 0.74% (0.46–1.09) and 0.06% (0.04–0.09) of total YLDs, respectively, contributing a combined 0.80% (0.52–1.16) to the global total.

YLDs

Of the 291 individual causes of nonfatal disease burden assessed, CD was the 30th leading cause of global YLDs for persons across all ages, surpassing other causes including autism, HIV/AIDS, cerebrovascular disease and malaria (Vos et al., 2012). CD was the 24th leading cause of global YLDs in males and the 51st in females (Institute for Health Metrics & Evaluation, 2012). For the three key childhood age groups across both sexes, CD ranked 4th, 6th and 7th for ages 5–9 years, 10–14 years and 15–19 years respectively (Institute for Health Metrics & Evaluation, 2012). For males aged 5–9 years, CD was the second leading cause of global YLDs behind iron-deficiency anaemia (Institute for Health Metrics & Evaluation, 2012). The YLD rankings of CD and ADHD for males, females and persons across all ages and within the three key childhood ages are shown in Table S1.

Globally, ADHD was the 98th leading cause of YLDs for persons across all ages and the 84th for males across all ages (Institute for Health Metrics & Evaluation, 2012). Within each of the three childhood age groups, ADHD was ranked as the 52nd, 44th and 61st leading cause of global YLDs for

persons (Institute for Health Metrics & Evaluation, 2012). In males aged 10–14 years, it was the 34th highest contributor to global YLDs, coming in ahead of diabetes, meningitis and intellectual disability (Institute for Health Metrics & Evaluation, 2012).

DALYs

As shown in Figure 1, global DALYs were significantly higher for males as compared with females for both CD and ADHD. Both disorders followed a similar pattern in terms of age, although ADHD peaked at 10–14 years, whereas CD remained relatively consistent between the 5–9 and 15–19 years age groups before dropping sharply as per diagnostic criteria (American Psychiatric Association, 2000). For all children aged 10–14 years, CD and ADHD combined accounted for 2.97% (1.89–4.27) of total global DALYs with CD being the major contributor (2.74%, 1.70–4.03; ADHD: 0.23%, 0.15–0.35).

Despite having no years of life lost (YLLs) component contributing to DALYs, CD was ranked as the 72nd highest contributor to global person DALYs of the 291 causes of burden (Institute for Health Metrics & Evaluation, 2012). This rank increased to 60th for males while ranking 91st for females. For children, CD was the 9th leading cause of DALYs for ages 5–9 and 10–14 years and the 13th for ages 15–

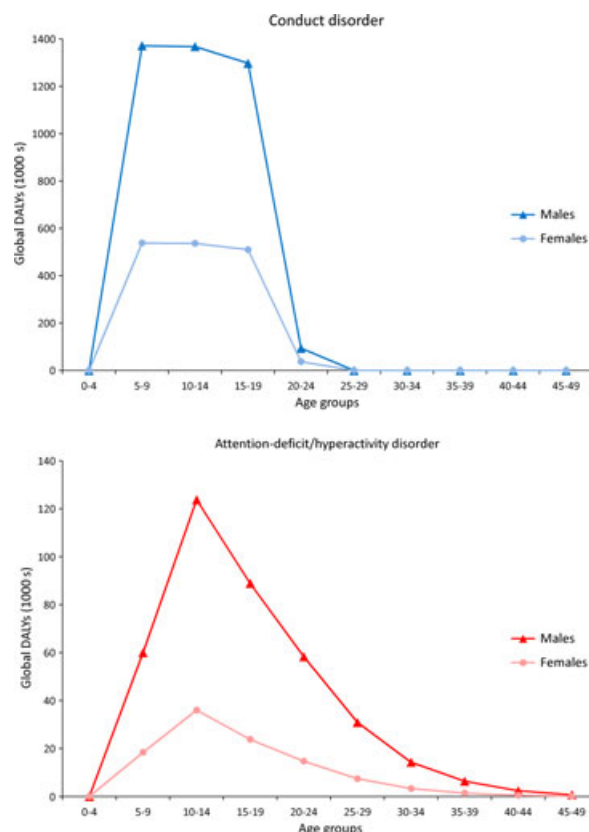


Figure 1 Global years lived with disability (YLDs)/disability-adjusted life years (DALYs) (in 1000 s) of conduct disorder and attention-deficit/hyperactivity disorder for males and females from ages 0 to 49 years

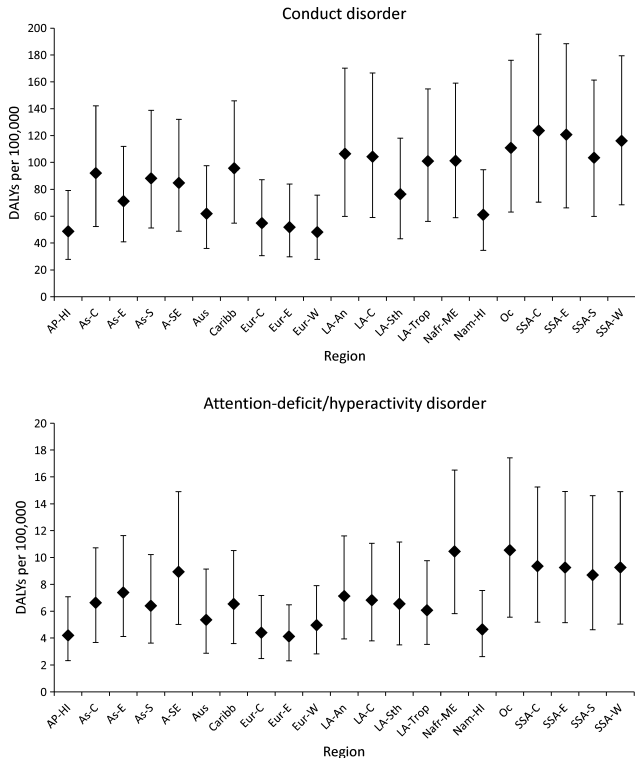


Figure 2 Regional years lived with disability (YLDs)/disability-adjusted life years (DALYs) per 100,000 people attributable to CD and ADHD

19 years (Institute for Health Metrics & Evaluation, 2012). For males aged 5–9 and 10–14 years, CD was the 6th highest contributor to global DALYs. The DALY rankings of CD and ADHD for males, females and persons across all ages and within childhood are shown in Table S2. Although ADHD was not in the top 100 leading causes of DALYs for persons across all ages, it was ranked 72nd of the 291 diseases and injuries in children aged 10–14 years whereas in males of that age, it was ranked 60th (Institute for Health Metrics & Evaluation, 2012).

The global age-standardized DALY rates per 100,000 of the population were 83.52 (49.98–127.25) and 7.14 (4.08–11.20) for CD and ADHD respectively. Figure 2 shows these rates at a regional level for both disorders. For CD, DALY rates ranged from 48.16 (27.78–75.62) in Western Europe to 123.67 (70.47–195.46) in Central Sub-Saharan Africa. DALY rates for ADHD ranged from 4.13 (2.30–6.48) in Eastern Europe to 10.56 (5.56–17.42) in Oceania. However, both disorders demonstrated overlapping confidence intervals for the majority of regions, indicating that the burden of CD and ADHD remained relatively consistent across the globe. Furthermore, at the country level, no country demonstrated DALY rates that differed significantly from the global mean for either disorder (see Figures S1 and S2).

Changes in the number of total global DALYs attributable to CD and ADHD between 1990 and

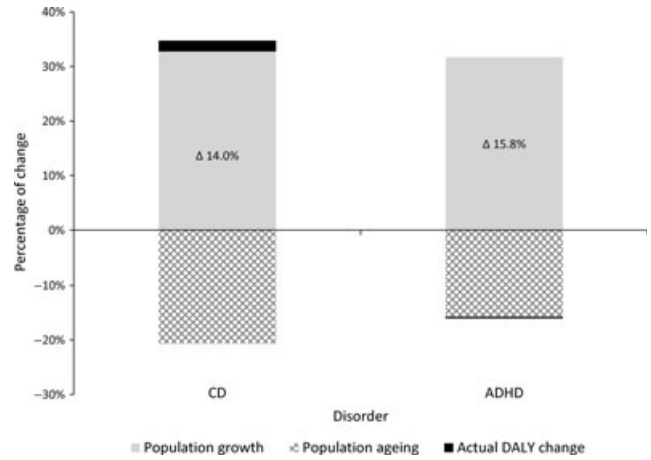


Figure 3 Decomposition of change in years lived with disability (YLDs)/disability-adjusted life years (DALYs) from 1990 to 2010 for CD and ADHD. Note: The Δ symbol represents the total percentage of change in DALYs

2010 were also investigated by utilizing methodology which accounts for population ageing and growth, as described in the capstone DALY paper by Murray, Vos et al. (2012). Although the number of DALYs for CD and ADHD increased by 14.0% and 15.8% respectively, Figure 3 demonstrates that the majority of this change is accounted for by population growth and ageing. Once these factors were removed, the actual change in DALYs was trivial.

Discussion

CD and ADHD contributed a total 6.24 million YLDs/DALYs to the total global burden of disease. They were particularly prominent in terms of nonfatal burden, together accounting for 0.80% of global YLDs across all ages. CD was a significant contributor to global YLDs, ranking as the 30th leading cause of nonfatal burden worldwide despite prevalence ceasing at the onset of adulthood as per diagnostic criteria. Furthermore, it was the 72nd leading cause of DALYs despite a complete lack of YLLs.

In contrast, ADHD was ranked 98th in terms of YLDs and did not reach the top 100 leading causes of global DALYs. In terms of total YLDs/DALYs, the number attributable to CD was nearly 12 times higher than for ADHD. This is despite ADHD continuing across the life span, in contrast to CD being treated as a childhood-specific disorder in GBD 2010. This disparity between the two disorders comes largely from the differences in prevalence and disability weights. In a previous publication detailing the statistical modelling of the prevalence input, the pooled prevalence of CD for 5–19 year olds was found to be significantly higher than for ADHD (Erskine et al., 2013). Furthermore, the disability weight of CD (0.236, 0.154–0.337) as captured by the disability weight survey was over 5 times higher

than that of ADHD (0.049, 0.031–0.074) (Salomon, Vos et al., 2012).

GBD 2010 required representative but parsimonious and consistent lay descriptions for all 291 diseases and injuries included in the study. As such, it was not feasible to feature all aspects of the presentation of CD and ADHD in the disability weight survey. It is possible that the disabling impact of ‘difficulties in concentrating, remembering things and completing tasks’ on an individual with ADHD may not be understood by the wider community. Robust evidence demonstrates that ADHD in school-age children significantly predicts worse educational, occupational, economic and social outcomes in midadulthood as well as a variety of comorbid conditions (Barkley & Fischer, 2010; Klein et al., 2012; Nigg, 2013). It is also worth noting that the disability weight for ADHD had overlapping bounds of uncertainty with other mental disorders, including Asperger’s disorder (0.110, 0.073–0.157), and some physical causes such as amputation of both legs (with treatment; 0.051, 0.032–0.076) and complete hearing loss (0.033, 0.020–0.052) (Salomon, Vos et al., 2012). However, GBD 2010 estimates burden in terms of health loss and does not take into account the current or future consequences that exist outside of the disorder’s direct health outcomes. Furthermore, it does not take into account the burden placed on an individual’s family or on societal systems such as welfare or criminal justice. This limitation of GBD 2010 has implications for all disorders, especially those occurring predominantly in childhood as burden later in life and beyond health are difficult to represent.

It is possible that the reference to ‘violent’ in the lay description for CD (as shown in Table 1) invoked a moral or legal judgment whereby respondents rated CD as causing greater impairment (Salomon, Vos et al., 2012). Although the notion of violence is representative of some core symptoms of CD, such as aggression to people and animals (American Psychiatric Association, 2000), lay responders may not have extrapolated other symptoms, such as deceitfulness, from the term ‘frequent behaviour problems’. Although violence is only one possible component of CD symptomatology, studies have shown that physical aggression is characteristic in children whose CD is serious and persistent (Kelso & Stewart, 1986; Le Corff & Toupin, 2013; Moffitt, 1993). As such, the disability weight yielded for CD is more likely to represent the severe end of the symptom continuum. We accounted for this to some degree by adjusting disability weights for the proportion of symptomatic versus asymptomatic cases as measured by the GSMS at the time of survey (Ezpeleta et al., 2001). This was important for burden calculations given studies indicating that an individual’s CD symptoms fluctuate over time (Lahey et al., 1995). However, although the GSMS is a well-known and reputable study, it is still based on a US sample and unlikely to be globally

representative. Further investigation is needed with regard to both the extent to which changes in the lay descriptions of CD and ADHD alter disability weights (and subsequently burden estimates) and differences in the severity of CD and ADHD between countries.

Although the inclusion of both CD and ADHD in GBD 2010 still represents a significant step forward in the recognition of these disorders, there are some other notable limitations. As reported in a previous publication, the modelled prevalence for both disorders was based on sparse epidemiological data (Erskine et al., 2013). Although DisMod-MR allowed us to use available data to predict prevalence for both CD and ADHD for all regions, including those with no data, the limitation of sparse data was reflected in the wide uncertainty intervals around the estimates. As more prevalence data for regions with little or no data become available, this will lessen the uncertainty surrounding the prevalence and subsequent burden estimates in future iterations of GBD. Furthermore, no information on excess mortality was found for either disorder. Given the nature of CD, it is feasible that those diagnosed are at greater risk of early mortality due to violence, high risk activities and substance use (Disney et al., 1999; Knop et al., 2009; Pajer, 1998). Although previous studies have found increased mortality in boys and girls demonstrating delinquent behaviours (Kjelsberg & Dahl, 1998; Laub & Vaillant, 2000; Pajer, 1998; Shepherd, Shepherd, Newcombe, & Farrington, 2009; Teplin, McClelland, Abram, & Mileusnic, 2005), there was no evidence of deaths occurring as a direct result of CD in the cause of death records used to estimate YLLs (Lozano et al., 2012). This is consistent with the lack of studies to date investigating excess mortality in diagnosable cases of CD (Erskine et al., 2013). If CD was associated with an increased mortality then the burden attributable to CD would further increase, especially when considering the young age at which death might occur.

Similarly, the burden calculated for both disorders did not include the burden of any other disease or injury attributable to CD or ADHD. Given that both ADHD and CD have been known to increase the risk of accidental injuries and harm (Barkley & Fischer, 2010; DiScala, Lescohier, Barthel, & Li, 1998; Jerome et al., 2006; Rowe et al., 2004; Schwebel et al., 2002), it is possible they are responsible for greater burden than has been attributed to them in GBD 2010. Generating the necessary data to make such calculations is an important focus for research to ensure that future disease burden estimates for these disruptive behavioural disorders are accurate. Given the significant limitations to the process of estimating the burden of ADHD and CD imposed by the existing literature, we suggest that future studies in the field address this lack of data, particularly with regard to nonwestern countries, mortality and direct outcomes of CD and ADHD.

Conclusion

Despite the limitations, the inclusion of CD and ADHD in GBD 2010 is a major milestone in the recognition of their population impact. The proportion of the total global burden of disease accounted for by CD and ADHD is large, given that the majority of their burden occurs within childhood as opposed to other causes of burden which occur across the life span. The increased focus on CD and ADHD may provide the impetus for more studies to be conducted, so as to fill knowledge gaps of the epidemiology of these disorders. This is of vital importance given that 40% of the world's population are under 25 years of age (United Nations, 2011). Furthermore, the substantial number of YLDs/DALYs and subsequent high rankings of CD in particular, emphasizes the necessity that the financial implications of this burden be investigated and the need for policy makers to appropriately resource the prevention and early intervention of mental disorders affecting childhood.

Supporting information

Additional Supporting Information may be found in the online version of this article:

Table S1 YLD rankings of conduct disorder and attention-deficit/hyperactivity disorder.

Table S2 DALY rankings of conduct disorder and

attention-deficit/hyperactivity disorder.

Figure S1 Conduct disorder age-standardized DALYs per 100,000 people in 2010.

Figure S2 Attention-deficit/hyperactivity disorder age-standardized DALYs per 100,000 people in 2010.

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Key points

- GBD 2010 marks the first time that burden has been calculated for CD and ADHD on a global scale.
- YLLs were not calculated for either disorder as no mortality was assigned to either as a direct cause.
- Globally, CD accounted for 0.74% of total YLDs and 0.23% of total DALYs (5.75 million YLDs/DALYs) whereas ADHD was responsible for 0.06% of total YLDs and 0.02% of total DALYs (491,500 YLDs/DALYs).
- Neither disorder demonstrated a significant change in burden between 1990 and 2010 once accounting for population growth and ageing.
- Despite the majority of their respective disease burden occurring childhood, the magnitude of the burden attributable to CD and ADHD warrants the attention of policy makers in terms of early intervention and treatment.

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