

University students with attention deficit hyperactivity disorder (ADHD): a literature review

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Objectives. To review existing literature about university students with Attention Deficit Hyperactivity Disorder (ADHD).

Methods. A framework for scoping studies and content analysis were used to source and review selected publications from PubMed, ScienceDirect, Google Scholar and relevant bibliographies.

Results. Seventy-four publications were reviewed and key findings were categorised under six core themes that represent the issues germane to university students with ADHD. These themes are: *academic, social and psychological functioning, giftedness, new media technologies, treatment, substance misuse and the non-medical use of prescription stimulants, and malingering.*

Conclusion. In Ireland and the United Kingdom (UK) young people with ADHD are unlikely to enrol into further education, and of those who do go to university, few will graduate at the same time as their non-ADHD peers. ADHD is associated with poor educational outcomes and it may be a hidden disability within institutions of higher education (e.g. universities). Surprisingly, in this topic area, there is a paucity of research in Ireland and the UK. Most studies originate from North America where research activity in the field has been ongoing since the 1990s. These studies however, tend to use relatively small samples of college (university) students recruited at a single institution. It is difficult to generalise the findings of these studies to student populations in North America, let alone in Ireland and the UK. At the very least, these North American studies provide insights into key areas of concern. This topic area straddles education and psychiatry. This means an inter-disciplinary approach is required to examine, better understand and address the impact of ADHD on the educational outcomes of university students. The philosophies of *difference, equity and self-realisation* can offer a conceptual framework for conducting further research and/or developing services to deliver more personalised learning support for university students with ADHD.

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Key words: Academic functioning, ADD, ADHD, college students, educational outcomes, higher education, university students.

Introduction

Attention deficit hyperactivity disorder (ADHD) is characterised by developmentally inappropriate and impairing inattention, hyperactivity and impulsivity. It often begins in childhood and frequently persists into adulthood. ADHD often co-occurs with mental health conditions (MHCs) (e.g. anxiety, depression, substance misuse, personality disorder), and other neurodevelopmental disorders (e.g. dyslexia, dyspraxia, autism spectrum disorder). The worldwide prevalence of ADHD is around 5% in children and adolescents, and 3–4% in adults (Faraone *et al.* 2015). Treatment of adult ADHD is uncommon in Europe (Asherson *et al.* 2016), yet ADHD poses a significant socio-economic burden. For instance, the lifetime cost of illness for a child born in England diagnosed with ADHD is

estimated at around £102 135 (Khong, 2014). This figure breaks down into costs associated with healthcare (£22 315), education (£45 075) and reduced earnings from employment (£34 745). This means that for every cohort of children born in England each year diagnosed with ADHD, the total mean lifetime cost of illness *per annum* is around £1 billion. The *cost of education* is clearly not far removed from the combined costs of healthcare and reduced earnings.

Under the Disability Act 2005 (Ireland) and the Equality Act 2010 (United Kingdom), ADHD is classified as a disability. These Acts stipulate that equality for disabled students, including those with ADHD, means adapting the way that institutions of higher education (HEIs) are structured by removing systemic barriers and/or providing extra support. HEIs have a legal duty to put in place 'reasonable adjustments', that enable disabled students to have access to everything that makes it possible to fully engage in their studies. Table 1 lists the potential range of education-related problems and reasonable adjustments for university students with ADHD. In the United Kingdom,

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Table 1 . Potential range of education-related problems and reasonable adjustments

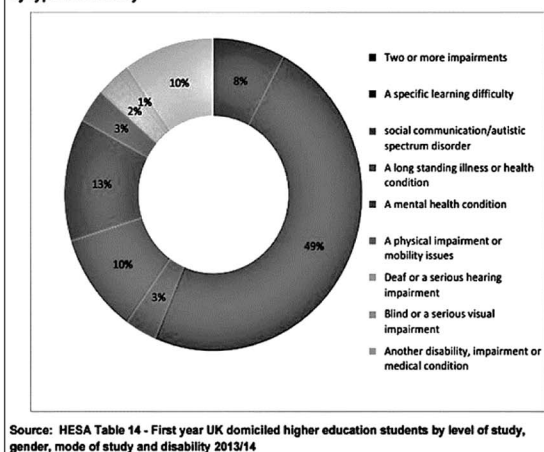
Education-related problems	Reasonable adjustments
Mind wandering (daydreaming; intrusive task-unrelated thoughts)	25–50% extra writing time in examinations
Poor working memory (requiring more time to understand complex conceptual ideas)	Separate room for writing examinations
Disorganisation and inefficiency	Being invigilated in an examination by a support worker familiar with ADHD
Difficulties with planning ahead; misjudging how long tasks take to perform (different conception of time)	Flexible start times for an examination
Procrastination (requiring more time to complete tasks)	10–20 minutes of a rest break during in examinations
Forgetfulness	The ability to negotiate extensions to deadlines for assignments
Difficulty sustaining attention (especially when bored or not engaged)	Where possible, the ability to negotiate part-time study or to defer examinations
Difficulties with following long explanations	Subject specific support (or one-to-one tutoring)
Hyper-focus on topics of self-interest to the detriment of other topics and tasks	Academic coaching

ADHD, Attention deficit hyperactivity disorder.

From Dept. of Business, Innovation & Skills (BiS) *H.E. Disabled Students Allowances Consultation: Equality Analysis* (Dec. 2015, p.17)

From Ass. for Higher Education Access & Disabilities *Numbers of Students with Disabilities Studying in Higher Education in Ireland* (Jan. 2016 p:18)

Chart 3: UK-domiciled undergraduate disabled entrants to UK higher education by type of disability



Nature of Disability

Figure 3 shows the disability profile of total disabled student population 2014/15

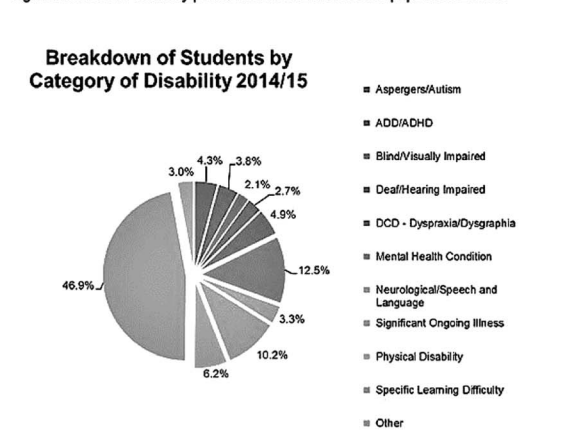


Fig. 1. Disabled university students in the United Kingdom and Ireland. ADHD, attention deficit hyperactivity disorder.

there is no prevalence estimate for ADHD in higher education. This is not the case in Ireland where categories of disability are much broader than in the United Kingdom. For instance, in 2015, the UK Department for Business, Innovation and Skills (BiS) (2015), published an equality analysis of disabled students' allowance. A pie-chart was used by BiS to depict percentages of disabled first year undergraduate (UG) university students in 2013/2014 (Fig. 1). This pie-chart shows that 49% of disabled students declared a specific learning difficulty (SpLD), 13% declared a MHC and 3% declared a

social communication/autistic spectrum disorder (ASD). Nothing is shown for ADHD. The second pie-chart in Fig. 1, shows the percentages of students who declared a disability at 27 universities in Ireland (AHEAD, 2016). In Ireland and the United Kingdom, similar percentages of students declared a SpLD, MHC and social communication/ASD (Aspergers/autism in Ireland). However, separate percentages for dyspraxia/dysgraphia (developmental co-ordination disorder (DCD)) (3%) and attention deficit disorder (ADD)/ADHD (3.8%) are shown for university students in Ireland.

The percentage of 3.8% ($n = 413$) for ADD/ADHD among university students in Ireland, accords well with the prevalence rate of 3–4% for ADHD in adults (Faraone *et al.* 2015). Research also estimates that in about 50% of cases, ADHD co-occurs with SpLDs, MHCs, DCD and ASD (Kessler *et al.* 2006; Germanò *et al.* 2010; DuPaul *et al.* 2013). In Ireland, 10733 university students declared a disability in 2014/2015, and 7544 in total declared a SpLD, MHC, DCD or ASD (AHEAD, 2016). If the ADHD comorbidity estimate of 50% is applied to this figure, and added to the 413 recorded cases for ADHD, then a total of about 4185 university students could have had ADHD. In 2014/2015 there were a total of 113 073 university students studying in Ireland (Higher Education Authority, 2014/2015). If a 4% prevalence estimate is applied to this figure, then potentially 4548 university students could have had ADHD. This figure does not differ greatly from 4185. In the United Kingdom, 673 185 first year UG and postgraduate university students were recorded as having ‘no known disability’ in 2014/2015, while 53 795 declared a SpLD, MHC or ASD (Higher Education Statistical Agency, 2014/2015). If a prevalence estimate of 4% is applied to the figure of 673 185, and the ADHD comorbidity estimate of 50% is applied to the figure of 53 795, it is interesting that both calculations suggest about 27 000 university students could have had ADHD. This analysis, in essence, highlights that the categorisation of ADHD as a SpLD within UK HEIs maybe causing ADHD to be a hidden disability (Young *et al.* 2013). A possible mis-or-under diagnosis of ADHD could also be happening within HEIs in Ireland. Often this is a problem in adults with ADHD (Asherson *et al.* 2016).

Method

A framework for scoping studies was used as a guide to identify, select, collate and review relevant publications in this topic area (Arksey & O’Malley, 2005). This framework tends to be used to rapidly map and synthesise pertinent publications in a topic area that has yet to be extensively reviewed (Mays *et al.* 2001). A combination of key words: ADHD; ADD; college students; university students; higher education; academic functioning and educational outcomes, were used to search the electronic databases PubMed, ScienceDirect and Google Scholar, for publications between 2001 and 2016. Titles and abstracts were initially screened and publications that matched the topic area were selected for review. Publications relating to assessment and diagnostic issues, school children and adolescence with ADHD, were excluded from this review. The reference lists of some publications, including anecdotal sources were also searched for additional information. Content analysis was applied to the selected publications. This method is often used to systematically retrieve meaningful data from written texts, categorise the data under core themes and produce a meaningful report of the results (Hodder, 1994). The search and selection strategy is shown in Fig. 2.

Results

A total of 74 publications were selected for review. These publications were read, summarised and the findings were categorised under six core themes titled: *academic, social and psychological functioning (ASP), giftedness, new media technologies (NMTech), treatment, substance misuse*

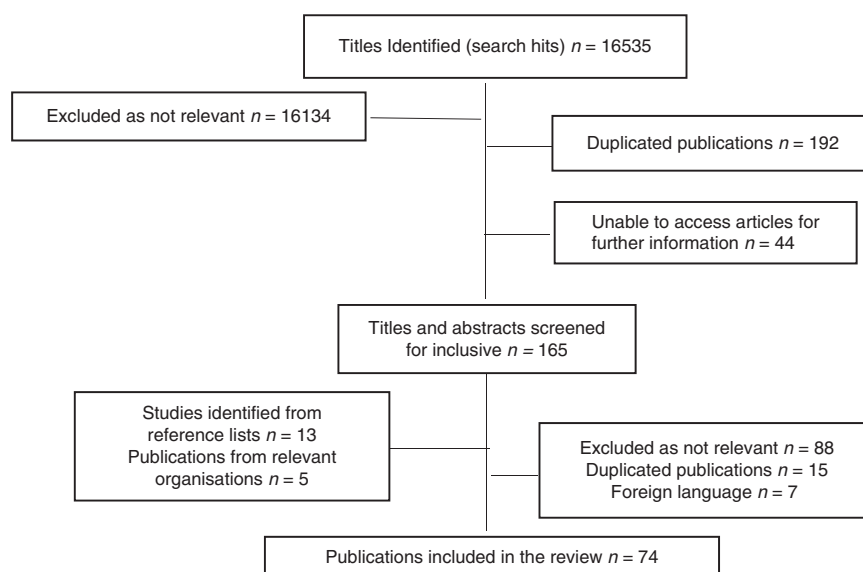


Fig. 2. Search and selection strategy for relevant studies.

and non-medical use of stimulant prescriptions, and malingering. These six core themes represent the findings of this literature review. Each theme is outlined and critically discussed with reference to pertinent literature.

ASP (Academic, Social and Psychological)

Studies about the ASP functioning of university students with ADHD, tend to focus on academic achievement (test scores) and academic performance (final grades, length and level of educational attainment, drop-out rates), social and romantic relationships, psychological and emotional functioning. In one systematic review, Arnold *et al.* (2015), reported on a number of studies that examined academic achievement and performance among university students with ADHD. This review found that this group of students tended to do poorly in academic tests and overall performance when compared with non-ADHD peers. Their academic outcomes seemed to improve significantly with treatment, especially multi-model treatment. However, the type of treatment and educational strategies for improving the educational outcomes of university students with ADHD is an area that requires further research (Birchwood & Daley, 2012; Rodger *et al.* 2015).

In another study, Pope (2010) investigated the incidence of ADHD symptoms in full-time UG psychology students and the impact ADHD had on their academic achievement. A total of 464 students ($F = 362$; $M = 102$), completed the short-version CAARS (Conners' Adult ADHD Rating Scale) and final scores were compared against their average percentage marks on completion of degree. Findings revealed that 106 students were rated as having ADHD ($n = 65$ inattentive sub-type; $n = 24$ hyperactivity/impulsivity sub-type; $n = 17$ combined sub-type). None of these students had previously been diagnosed with ADHD. A total of 363 students graduated as expected, while 88 students failed to graduate for a number of reasons, including 13 students who submitted extenuating circumstances. Students rated as having ADHD *inattentive sub-type* were less likely to graduate, whereas *hyperactivity/impulsivity sub-type* did not seem to affect graduation status. Higher hyperactivity/impulsivity scores were reported more by male rather than female students. Other studies also associate ADHD inattentive sub-type with poor academic functioning (Rabiner *et al.* 2008; Weyandt & DuPaul, 2008), but it was not clear if Pope (2010), observed a similar outcome for students rated as having ADHD combined sub-type. The CAARS tends to have good psychometric properties (Kooji *et al.* 2008), but the ethnic minority status of the students in Pope's study needed to be reported. It is an important consideration when using the CAARS, as

normative studies did not report on its applicability with ethnic minority groups (Macey, 2003).

Factors that could predict academic success in university students with ADHD, which included coping strategies for managing symptoms associated with ADHD, was investigated by Kaminski *et al.* (2006). In this study, 68 students aged between 18 and 23 years old ($F = 29$; $M = 39$; $n = 64$), enrolled at one top university in the United States were recruited as participants. These students were classified as high-success (HS), or low-success (LS) academic performers, depending on their grade point average scores. Participants completed a range of standardised measures, including the Coping Resources Inventory for Stress. The findings of this study focused on strategies for coping with ADHD, obstacles to academic success and sources of motivation. The participants reported coping strategies such as: working longer and harder than others; getting social support; using good organisation, time management and study skills; exercise; a positive mental attitude; spirituality/religion or meditation; self-awareness/therapy; fidgeting; being a perfectionist; self-acceptance and manipulating others or the 'system'. The obstacles to success were reported as: procrastination; not using organisational, time management and study skills; peer pressure to socialise instead of study; lack of time to study and being a perfectionist. Sources of motivation were reported as: to make others proud; not let others down; long-term career goals; not let myself down; prove to others (who said I would fail) that I can succeed; fear of failure; competition with peers; stress associated with procrastination and long-term financial goals.

Kaminski *et al.* found that a range of factors predicted academic success. Academic coaching tends to focus on similar aspects in order to enhance academic functioning (Parker *et al.* 2013). Interestingly, procrastination was reported as an obstacle to success. Procrastination at times, is described as a 'students worst enemy' and tends to be associated with poor academic performance (Rice *et al.* 2012). In Kaminski *et al.*'s study the 'stress of procrastination' was also reported as a source of motivation. This also suggests not all 'stress' is bad. For instance, *eustress* is said to be positive or beneficial stress. It refers to how an individual perceives a stressor (negative = threat *v.* positive = challenge) (Fevre *et al.* 2006). The concept of *eustress* can account for why the 'stress of procrastination' could motivate some university students to study. Another interesting finding in Kaminski *et al.* study, was that certain coping strategies seemed to differentiate HS and LS students. The LS students reported better physical fitness than their HS peers. Kaminski *et al.* surmised that LS students may have been healthier, fitter, but less academically successful, because they spent most

of their free time exercising instead of studying. None of the students reported exercise as an obstacle to success, although 10 HS students in comparison to 17 LS students, said they used exercise as a coping strategy for ADHD. Physical exercise is known to have a number of physical and mental health benefits against stress, anxiety, depression, ADHD and so on (Den Heijer *et al.* 2017). It is not surprising that university students can use exercise to cope with symptoms of ADHD. While the sample size in Kaminski *et al.*'s study was small and all participants were recruited at a single university, these researchers did report this as a potential methodological limitation and said generalising the findings could be problematic. However, the focus of this study on coping strategies was an important one. Other studies also find a sub-set of university students with ADHD who have positive educational outcomes, and the prevailing assumption is that these students cope better with their symptoms (Wilmshurst *et al.* 2011).

In relation to social and romantic relationships, university students with ADHD have reported lower levels of social adjustment, social skills and self-esteem than their non-ADHD peers (Shaw-Zirt *et al.* 2005). Male university students with ADHD inattentive sub-type in particular, have reported lower numbers of steady relationships, feeling less assertive and more uncomfortable in dating situations, in comparison to male peers with ADHD combined type or without ADHD (Canu & Carlson, 2003). In another study, UG male and female students with ADHD did not display psychological aggression in their dating and marital relationships, but they were more likely to behave physically and sexually aggression (Therialt & Homberg, 2001).

Studies about the psychological or emotional functioning of university students with ADHD seem to produce inconsistent findings. For instance, Richards *et al.* (1999), examined the differences in psychological functioning among university students with confirmed ADHD ($n = 29$), 'self-reported only' (SRO) ADHD ($n = 18$), and without ADHD ($n = 146$), at one large state university in the United States. These students completed a range of standardised rating scales, including the Symptom Checklist-90-R (SCL-90-R), which assesses a range of psychological symptoms and levels of distress associated with each symptom. The findings of the study revealed that in comparison to the students without ADHD, students with confirmed ADHD and SRO ADHD, both scored significantly higher on the SCL-90-R. This suggested that poor psychological functioning was similar in both these groups of students. Inversely, Wilmshurst *et al.* (2011) examined the self-concept and psychological well-being of UG university students with ADHD ($n = 17$), and without ADHD ($n = 19$), at one small private

university in the United States. No difference was found between these groups on measures of self-concept and psychological well-being. The only difference related to sources of emotional and academic support, with students with ADHD seeking more support from their fathers, whilst students without ADHD, sought more support from their friends. In both studies just reported, small and non-representative samples are again an issue. The inconsistency in their findings could also be an artefact of where these studies were conducted. Socio-economic status rather than just ADHD (e.g. the rich <> poor divide in American colleges), could have been responsible for the observed findings, Socio-economic status is an established factor that influences psychological and emotional well-being (Hacker & Marcus, 2015).

Giftedness

There is research which shows that the attributes and/or behaviours of intellectually gifted students can resemble the characteristics of ADHD, other learning difficulties or disabilities including ASD, or other MHCs (Beljan *et al.* 2006; White & Shaw, 2011; Neihart *et al.* 2015). This research suggests that university students with ADHD can appear easily distracted, fail to finish projects that they start or shift between activities frequently, but likewise, creative individuals have a broad range of interests fleeting from one project to another (Lahey *et al.* 1988; White & Shaw, 2011; Zabelina *et al.* 2014). The inattentiveness of ADHD observed as day-dreaming, boredom and not listening to others, is also similar to a creative person's tendency to mull around ideas, lose interest in one idea for another, and pay attention to their own internal thoughts and visualisations (Cramond, 2011). The hyperactivity of ADHD is similar to the tendency of creative people to radiate with vitality and high levels of energy (Clark, 2002). The impulsivity of ADHD is similar to the risk taking and sensation-seeking behaviour of creative people (Cramond, 2011). The intense and/or sensitive temperament of ADHD is similar to the 'drama' of creative people, who can also come across as socially awkward just like some people with ADHD (Webb, 1993; Silverman, 1994). In the literature, the 'creative gifts or giftedness' of people with ADHD is widely documented (Cramond, 2011; White & Shaw, 2011; Zabelina *et al.* 2014; Lee & Olenchak, 2015).

The phenomenon of being intellectually gifted and/or talented plus having ADHD (or another disorder) is termed 'twice-exceptionality ($2e$)'. The typical characteristics of $2e$ students are listed in Table 2. For Brody & Mills, students with $2e$ 'could be considered the most misunderstood' (1997: 292). Anecdotal evidence suggests that famous people like Alan Turing, who is

Table 2. Typical characteristics of students with twice-exceptionality (adapted from: National Education Association 2006, p.7)

Strengths	Limitations
Verbal abilities	Reading and writing
Observational skills	Working memory
Critical/divergent thinking, problem-solving and decision-making skills	Organisational and study skills
Curious, creative, original and imaginative	Attention
Hyper-focus on special interests	
Broad range of interests which may not be related to studies	Poor performance in one or more academic subjects
Sense of humour	Immature, stubborn, inflexible or opinionated
"Street-wise"	Sensitive to criticism; impulsive, poor social skills

accredited for helping Britain win World War II by breaking the Enigma Code, could have had *2e*. One British Broadcasting Corporation (BBC) News article said "Turing was accustomed to being a non-conformist. At boarding school, he refused to adapt and ignored subjects that did not interest him" (BBC News, 1999). In colloquial language, *2e* is referred to as the 'Geek syndrome' (MIT, 2003).

In one study Dare & Nowicki (2015), interviewed five parents ($n = 4$ mothers; $n = 1$ father), about how they discovered their children had *2e* and how they experienced parenting their *2e* children ($n = 2$ females; $n = 3$ males), aged from 11 to early 20s years old. These parents described their children as having extreme strengths and weaknesses that made schooling frustrating. These parents had to seek assistance beyond the educational system, which included paying for private assessments in order to better understand the support needs of their children. They described their parenting experiences as challenging, confusing and frustrating. This study highlighted how the interplay between exceptional strengths and weaknesses in a single young person can result in inconsistencies in academic performance, and this is an important finding.

Since ADHD can produce low results on standardised tests, *2e* can be missed by educational institutions that rely on high test scores in order to identify intellectual giftedness/talent (Lee & Olenchak, 2015). Inversely, students who obtain good grades but still report symptoms related to ADHD are also most at risk of not getting their ADHD diagnosed/treated (Beljan *et al.* 2006). It can be difficult for educationalists and clinicians to differentiate ADHD from traits of giftedness like intensity, drive, perfectionism, curiosity and impatience (Webb, 1993; Silverman, 1994). Educators who are successful with *2e* students advocate for appropriate and supportive educational environments that allow for these students to flourish (Davis *et al.* 2011). Interventions for supporting *2e* students have to be personalised, targeted at meeting their strengths,

focussed on developing their talent(s), while also adjusting for their disabilities (Brody & Mills, 1997; Beljan *et al.* 2006). As Baum *et al.* state, 'if we cannot design appropriate interventions that will nurture human potential, much of the world's best human capital will never reach its potential' (1998: 97).

NMTech (New Media Technologies)

Young people today, like no previous generation of young people, are totally au fait with NMTech, which includes internet-based resources like social media and video gaming. NMTech is pervasive in the lives of young people. Young adults with ADHD, for example, are found to be prone to gambling addiction (Breyer *et al.* 2009), and internet addiction in the order of online gaming, chatting, down-loading, e-mailing and pornography (Yen *et al.* 2007). The severity of ADHD symptoms in a sample of Turkish university students was found to predict the severity of internet addiction (Dalbudak & Eren, 2014). NMTech can be adapted for positive use in educational environments, but some researchers posit a correlation between NMTech over-use among young people and observed deficits in executive function (EF) that may account for a rise in ADHD-related behaviours (Rideout *et al.* 2010). ADHD is not a definitive disorder and its associated behaviours (e.g. aggression, delinquency, substance misuse) are said to exist on a continuum of 'ADHD-related behaviours' (Larson *et al.* 2011).

Young people who exhibit extreme ADHD-related behaviours could have a range of problems associated with oppositional defiance disorder and conduct disorder (Pringsheim *et al.* 2015), as well as academic under achievement (Daley & Birchwood, 2010). In one study, Nikkelen *et al.* (2014), examined the relationship between genetic disposition, exposure to media violence and ADHD-related behaviours. While the findings did suggest that excessive NMTech use could precipitate ADHD-related behaviours, conversely, young people who already exhibit

ADHD-related behaviours could be overusing NMTEch in attempts to nourish their desire for stimulation (Nikkelen *et al.* 2014). Research on the relationship between NMTEch and ADHD-related behaviours remains inconclusive. But it is still useful to consider the role of NMTEch in the lives of university students with ADHD, especially when assessing their learning support and/or treatment needs.

Treatment

First-line treatment for ADHD is stimulant medication, usually methylphenidates like Ritalin. The safety and efficacy of stimulant medication in treating children with ADHD has been demonstrated (Bolea-Alamañac *et al.* 2014), yet diagnosis and treatment of adults with ADHD remains controversial in many European countries (Kooji *et al.* 2010). This is interesting in light of a study about the efficacy of psychiatric drugs in relation to common medical drugs, which found that ADHD medications are the most efficacious of all medical drugs (Leucht *et al.* 2012). Research about the efficacy of treatment in university students with ADHD is rare and the extent to which psychiatrists consider the unique demands of university life when prescribing medication regimes for students is unknown (Rabiner *et al.* 2009a). University students with ADHD who do take medication report improvements in their note taking, scores on quizzes, writing output and homework completion (Advokat *et al.* 2011). In one controlled, cross-sectional study that investigated the effects of medication on cognition in adults with ADHD, findings revealed that those taking medication had significantly better scores on IQ tests when compared with adults with ADHD who were not being treated (Biederman *et al.* 2012).

Shire Pharmaceuticals conducted the first randomised controlled trial to test the efficacy of Vyvanse (lisdexamfetamine dimesylate), with a sample of 24 university students diagnosed with ADHD (DuPaul *et al.* 2012). The drug was administered to these students over a 5-week period and large reductions in ADHD symptoms were observed, with subsequent improvements in task management, planning, organisation, use of study skills and working memory. While the short duration of this study did preclude an assessment of longer-term outcomes in academic functioning, in other studies university students with ADHD who take stimulant medication reported that it helps them academically (Advokat *et al.* 2011). However, a substantial number of these students also do not take their medication as prescribed (Rabiner *et al.* 2009a). One reason for this is when and how much medication is taken by a student with ADHD, seems dependent on what academic tasks need to be completed at a particular time

(DeSaints *et al.* 2008). This may also imply that additional investigations of “pro-re-nata” (PRN) use of stimulant medication amongst university students with ADHD could be indicated (Greely *et al.* 2008).

No research about the efficacy of psychological treatments for university students with ADHD was found. Weiss *et al.* (2008), conducted a review of the literature on psychological treatments for adults with ADHD. Out of 1419 articles only five were empirical studies that suggested psychological interventions were useful. This review highlighted a disproportionate emphasis on medication as the treatment choice for adults with ADHD, and recommended the development of more psychological interventions. Some studies do suggest the use of cognitive behavioural therapy (CBT) for university students with ADHD, because it has shown effectiveness in adults with ADHD for treating maladaptive and self-critical thinking processes (Ramsay & Rostain, 2006; Young & Bramham, 2012; Pettersson *et al.* 2017). Academic coaching could be another useful intervention for university students with ADHD, but it is difficult to define it as a psychological treatment. Passmore stated that ‘coaching has become a recognized intervention, but sadly there are still no standards or licensing arrangements which are widely recognized. Professional bodies have continued to develop their own standards, but the lack of regulation means anyone can call themselves a coach. Whether coaching is a profession which requires regulation, or is professional and requires standards, remains a matter of debate’ (2016: 3).

Nonetheless, academic coaching could help university students with ADHD to identify goals, develop study plans and strategies for achieving these plans, as well as monitoring progress towards attaining them – it can foster self-determination (Prevatt *et al.* 2011). In one study, coaches helped university students with ADHD to develop self-regulatory behaviours such as time management, organisational skills, paying attention in class and taking good notes, with improvements still observed after 8 weeks (Swartz *et al.* 2005). In another study, 19 university students with ADHD on 10 different US campuses were interviewed about the benefits of coaching. These students said that coaching helped to increase their self-discipline, self-efficacy, study skills, formulate realistic goals, think more frequently about their long-term goals and maintain a desire to achieve them (Parker *et al.* 2013). Additional benefits of coaching were in helping university students with ADHD to feel more in control of their emotions, behaviours and desires in the face of external demands – it strengthened resilience (Parker *et al.* 2011). Although coaching and CBT, whether delivered online or face-to-face may be effective interventions for university students with

ADHD (Young & Bramham, 2012; Curtis *et al.* 2013), no studies were found that investigated their impact on improving academic grades and/or educational outcomes in general. These interventions could, however, enhance confidence, provide reassurance, and help university students with ADHD to learn new skills or develop different coping strategies for managing academic pressure (Field *et al.* 2013).

Substance misuse and non-medical use of stimulants

The patterns of substance misuse among university students with ADHD is such that they are about three times more likely to have used cannabis or tobacco, and about five times more likely to have used other illicit substances, in comparison to their non-ADHD peers (Rooney *et al.* 2012). University students with ADHD are also said to regularly consume alcohol, feel less able to control their alcohol intake and be more prone to episodes of binge drinking (Baker *et al.* 2012). University students with ADHD who use stimulant medication tend to report more drinking-induced blackouts, hospitalisation due to drinking, losing friends and romantic partners as a result of their drinking habits (Baker *et al.* 2012). In one study as cannabis and alcohol misuse escalated, university students with ADHD, increasingly skipped classes and reductions in their grades were observed. As this chain of events was experienced, the likelihood of misusing stimulant medications for academic purposes also increased (Arria *et al.* 2013).

University students with ADHD who use stimulant medications are more likely to be approached by other students to sell, give or barter their medications (McCabe *et al.* 2006), while students taking other medical prescriptions are more likely to use their medication to barter for stimulants (McCabe *et al.* 2005; Holloway & Bennett, 2012). In one study Rabiner *et al.* (2009b), investigated the misuse and diversion of stimulant medications among 115 university students. Findings revealed that 89 of these students (69%) had used their medication as prescribed. However, 36 students (31%) had misused their medication by taking larger doses, or more frequent doses, or they used someone else's medication, while 30 students (26%) had given their medication to peers and nine students (8%) had engaged in intranasal use in the previous 6 months. In a review of studies from North America, between 5% and 35% of university students reported having used 'study drugs' in the last year (Wilens *et al.* 2008). In Europe prevalence rates for the use of 'study drugs' is estimated between 0.8% and 16% (Castaldi *et al.* 2012; Maier *et al.* 2013; Ott & Biller-Andorno, 2014). University students coin stimulant medication used for academic purposes as study drugs, smart drugs, brain dope or academic

steroids. The misuse of stimulant medication is also described by several names – pharmacological cognitive enhancement (PCE), neuro-enhancement, cosmetic pharmacology.

The first national online survey of 'PCE' use in the United Kingdom and Ireland was conducted by Singh *et al.* (2014). In this survey, 877 students with *no known* diagnosis of ADHD were asked questions about smart drugs, patterns of use, purpose of use and ethical issues pertaining to their use. The listed medications were methylphenidate, adderall, modafinil, donepezil, piracetam and atomoxetine. Most of the students (79%) were enrolled at 23 of the 24 Russell Group Universities. The most represented universities were Bristol, Manchester, Cardiff, LSE, Cambridge, Oxford and UCL. The top seven descriptions of 'smart drugs' reported by the students were caffeine pills, methylphenidate, energy drinks, vitamin supplements, modafinil, tranquillizers and speed. About 30–45% of students reported using energy drinks and caffeine pills as PCEs, while only 35 students reported using methylphenidates as PCEs (almost 4%). Modafinil was the most unknown yet also the most used, with 54 students using them as PCEs (almost 6%), whereas about 59% (514 students) said they had never heard of modafinil and about 24% (213 students) said they had no interest in trying the drug. Two-thirds of the students reported no interest in using methylphenidate, adderall or modafinil for any purpose and 14% of students ($n = 123$) had never heard about smart drugs. The most common reasons cited for not using methylphenidate, adderall or modafinil was a lack of availability, followed by concerns about side-effects and illegality. Students who had used study drugs, mainly obtained them from friends, although in the case of modafinil, via the internet. Although 69% of students agreed or strongly agreed that PCE use at university was ethically problematic, for the students who had used or considered using smart drugs, the use of PCEs at university was not reported as problematic. When PCE use was framed in the context of cheating, 72% of students disagreed that it was cheating. Singh *et al.* concluded that university students in the United Kingdom and Ireland were resilient to PCE use, because low prevalence rates of using smart drugs were reported in their study.

Not much is known about the use of study drugs outside the US student population. Duke University in the United States for instance, has enacted a policy banning the misuse of prescription stimulants for academic purposes, adding it to the definition of cheating (Lakhan & Kirchgessner, 2012). This contrasts with the finding by Singh *et al.* (2014), that 72% of students disagreed that PCE use was cheating. Defining the use of study drugs as cheating could fuel notions that stimulant medications enhance academic performance, and

Table 3. Summary of key findings about university students with attention deficit hyperactivity disorder (ADHD)

Core theme	Findings
Academic, social and psychological functioning (ASP)	Poor academic achievement in tests and overall academic performance ADHD inattentive sub-type mainly associated with poor academic performance Lower levels of social adjustment, social skills and self-esteem in social and romantic relationships Inconsistent findings about psychological and emotional functioning A range of factors can predict academic success Eustress (positive mental attitude/resilience) and exercise may be a good coping strategies for ADHD
Giftedness	Not easy to differentiate symptoms of ADHD from traits of intellectual giftedness Twice-exceptionality (2e) describes the co-occurrence of ADHD, other disorders with intellectual giftedness. Students who get good grades but still report ADHD symptoms are most at risk of not getting treatment
New media technologies (NMTech)	Internet overuse (or addiction) may be a concern in ADHD NMTech could precipitate or perpetuate ADHD-related behaviours (but the research is inconclusive) Ask university students about NMTech use during assessments for ADHD
Treatment	Research in university students with ADHD is rare Not clear if psychiatrists consider the unique demands of university life when prescribing medication Academic achievement and performance increases with medical treatment Unclear if psychological interventions improve academic functioning Coaching is not defined as a psychological treatment, but may be useful
Substance misuse and the non-medical use of stimulants	More likely to misuse tobacco, alcohol and other licit or illicit substances Prevalence rates for use of "study drugs" is between 5-35% in North American and 0.8-16% in Europe (excluding Ireland and the UK) In Ireland and UK resilience to PCE use and low prevalence rates were reported in one study
Malingering	Concerns about feigning ADHD to get a prescription for stimulant medication Detection depends on the knowledge, skills and expertise of the practitioner undertaking a diagnostic assessment Consider 2e, co-morbidities or other conditions, before assuming malingering

PCE, Pharmacological cognitive enhancement.

this could drive the practice underground, just like all other illicit substances. The use of illicit substances does contravene the drugs and alcohol policies of most universities, and it may make sense to include the misuse of prescribed stimulants under this policy. However, such a move, especially in Ireland and the United Kingdom, where recognition of adult ADHD is beginning to grow, might heighten concerns about university students malingering with ADHD and/or augment unhelpful assumptions that ADHD is not a real disorder (Moncrieff *et al.* 2011).

Malingering

Malingering describes the behaviour of pretending to ill. Some authors believe university students malingering with ADHD. The research on malingering suggests that university students do so to get a diagnosis of ADHD and a prescription for stimulant medication (Harrison *et al.*

2007). In one systematic review of studies about malingering, Musso & Gouvier (2014), reported on a number of strategies that university students used to feign ADHD during an educational psychology assessment. These strategies included ignoring visual and auditory stimuli, making intentional errors of commission and omission, responding randomly to questions, fidgeting with intention, 'zoning out', disobeying instructions, selecting items on a screening tool that matched Diagnostic Statistical Manual (DSM-IV) criteria, pretending to have trouble with memory recall or acting confused. Concerns about malingering among university students have prompted researchers to look for reliable assessment methods for its detection. Out of several ADHD symptom checklists, neurocognitive tests, symptom validation tests, neuropsychological assessments, none had proved to be reliable in detecting malingering (Conners, 1995; Booksh *et al.* 2010; Sollman *et al.* 2010; Jasinski *et al.* 2011). A reason given for this finding was

that many psychological measures/instruments have subscales to assess the validity of self-reports, but ADHD symptom checklists/assessment tools do not have similar subscales (Quinn, 2003). University students who self-report symptoms of ADHD, especially with the absence of teachers or parents' information, can feign ADHD, in the same way that anyone can feign a mental or physical health condition. The detection of malingering ultimately depends on the knowledge, skills and expertise of the practitioner undertaking the assessment of ADHD. While concerns about malingering are valid, the belief that university students tend to pretend to have ADHD, can also result in a failure to recognise the disorder (Webb, 2001). A missed or under diagnosis of ADHD is even more likely in university students who are 2e, obtain good grades or have developed effective coping strategies for their symptoms (Beljan *et al.* 2006).

Discussion

A summary of the key findings is presented in Table 3. These findings contribute to understandings about the impact of ADHD on the educational outcomes of university students. Methodological limitations of most of the studies, such as small sample sizes recruited at a single institution, makes it difficult to generalise findings to university student populations in North American, Ireland and the UK. Many of the studies reviewed also tended to compare the academic functioning of university students with ADHD *versus* their non-ADHD peers. Not many studies examined educational outcomes of university students with ADHD relative to their peers with ADHD. But once this is done, it becomes apparent that many university students with ADHD adjust well to all the domains associated with university life (Blase *et al.* 2009). Another issue could be the assumption that EF deficits affect the way that university students with ADHD learn and process information (Biederman *et al.* 2006). The research about the EF deficits <> ADHD pathway to poor educational outcomes remains inconclusive. EF deficits are not found in all people with ADHD (Thorell, 2007). This could explain why some studies (e.g. Pope, 2010) identified more with the EF deficits <> ADHD inattentive sub-type pathway to poor educational outcomes, rather than with the hyperactivity/impulsivity or combined sub-type. ADHD inattentive sub-type is usually associated with poor academic functioning (Weyandt & DuPaul, 2008). Females are said to have more ADHD inattentive sub-type (Hinshaw *et al.* 2012), yet females are also more likely than males to do well at school, enter into higher education and graduate from university (Independent Commission on Fees, 2015).

Traditional educational environments are said to be ADHD-user unfriendly (Carter, 2005; Davis *et al.* 2011; Dare & Nowicki, 2015; Lee & Olenchak, 2015). One argument for the association between ADHD and NMTEch overuse, substance misuse, non-medical use of stimulant medications and malingering, could be that they are evolutionary strategies used by university students with ADHD to adapt to systemic barriers within HEIs (Slee, 2013; Barberis & Buchowicz, 2015). In the early 1900s, one of the key principles of 'scientific education' was 'to eliminate the waste of retardation, ill-health and lowered vitality' (Bobbitt, 1912: 266). Grades on standardised tests seemed to be the means by which this 'elimination' occurred (Terman, 1906; Snedden, 1921). Even today, this still could be one reason why university students with ADHD generally do not perform well in time-limited examinations.

Conclusion

In Ireland and the United Kingdom, a paucity of research about the impact of ADHD on the educational outcomes of university students was found. This is concerning because ADHD is typically associated with poor educational outcomes. This literature review provides some insights into key areas of concern. While symptoms of ADHD can indeed impair learning at university, no research in Ireland or the United Kingdom, was found about how reasonable adjustments to programmes of study promote positive educational outcomes. No studies were found that examined the views and perceptions of university students with ADHD about how they adjust to university life, or about the academic challenges they face and how these are managed or overcome. This gap in the literature needs to be addressed. University students seem to continuously face a lack of timely access to treatment services for ADHD. In some areas in the UK for instance, waiting times for access to treatment in the National Health Service (NHS) can be up to 2 years. University students who suspect they may have ADHD cannot afford to wait this long to access treatment, without risking academic failure or increased psychopathology. For these students' the misuse of caffeine products or stimulants (licit or illicit) may seem like attractive options.

The provision of rapid access to treatment for students with ADHD may be a challenge for clinicians working in national health services. Such challenges have motivated the author to undertake a research project to develop a model of practice, that sits at the interface between education and psychiatry. This interdisciplinary designed model will provide HEIs with a strong business case for funding ADHD diagnostic assessments for their students. For too long young

people with ADHD have been marginalised. Under current systems, these students continue to be at considerable risk of not having their learning problems, treatment and support needs identified. Interestingly in 2005, Maryla Carter submitted similar concerns in a memorandum to the Select Committee on Education and Skills in the UK Parliament about children with ADHD. In an excerpt from this memorandum she stated: ‘... this situation is leading to children with ADHD being “abused” by the system—a system which has not been designed to include such neuro-atypical human beings ... yet with a prevalence of around 3% one could argue that having ADHD is not particularly atypical – but merely different ... As things stand at present, the real needs of children with ADHD are being sacrificed upon the altar of inclusion ... All too often the outcome is the complete opposite of this—exclusion ... frequently followed by problems to do with mental health, drug addiction and the criminal justice system ... Our society is paying an enormous price for this imposition of inappropriate education ...’ (Carter, 2005).

The philosophies of difference, equity and self-realisation can provide a conceptual framework for researchers wanting to undertake further work in this topic area. The *difference* of ADHD needs to be recognised and catered for within learning environments (Mackenzie & Watts, 2011). Once this is achieved, *different* educational outcomes for university students with ADHD may ensue. Equity is about enabling university students with ADHD to increase the good things in their lives and decrease the bad things (Bentham, 1948). *Equity* is central to the principle of *difference* and *self-realisation*, which is about the right of university students with ADHD to achieve their full academic potential, even if it means providing them with extra support (Dewey, 1893). The social model of disability supports this view and adds the importance of removing systemic barriers that deter *self-realisation* (Oliver, 2013). After all, university students with ADHD are at a crucial stage of transitioning into adult life. Their success at university is likely to determine their career success and progression within highly competitive employment markets.

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Conflicts of Interest

None.

Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committee on human experimentation with the Helsinki Declaration of 1975, as revised in 2008. The authors assert that ethical approval for publication of this review article was not required by their local REC.

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