**Functioning and participation problems of students with ADHD in higher
education: which reasonable accommodations are effective?**

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Abstract

Students with ADHD struggle in higher education as a result of various functioning and participation problems. However, it remains unclear how often and during which teaching and evaluation methods problems arise, and which reasonable accommodations are effective to deal with the functioning and participation problems of students with ADHD in higher education. This study addresses these three gaps in literature. In total, 86 students with ADHD, 42 student counsellors and 86 students without a disability participated in a survey-based study. The results show that students with ADHD most frequently experience problems with sustaining and focusing attention and it is demonstrated that most problems arise during classical teaching or evaluation methods. Finally, the perception of the effectiveness of reasonable accommodations is strongly dependent on which problems students experience in higher education. These findings suggest that it is important to consider both personal and environmental characteristics when selecting and implementing reasonable accommodations.

Background

Thomas, a 22 year old university student, was diagnosed with ADHD at the age of 19. Currently, he is enrolled in the 3rd year of a Bachelor Program. As a child, Thomas experienced difficulty with focussing his attention. The teacher often reprimanded him because he was daydreaming or looking out the window. His parents also noticed that he was very active and had a lot of energy. Thomas always participated in a lot of sports activities. When he was around his friends, parents or teachers, he was very impulsive and interrupted them a lot. Thomas was also described as a boy who was very impatient and hated waiting for something or somebody. During adolescence, Thomas learned how to cope better with his difficulties from childhood and in middle school he was described as a very creative and intelligent teenager. He graduated with average grades and continued his studies at a university. At university, his difficulties staying focussed, planning and organizing, and impulsive behaviour became more impairing. Now, his high levels of energy have decreased but Thomas ruminates a lot. He feels worried that he will miss deadlines or forget important information and has difficulty relaxing. Because of these problems, Thomas encounters a lot of difficulties at university. He, for example, has problems studying for exams and keeping his attention focused on the professor or his books, or misses deadlines due to his problems with planning and organizing.

Thomas is a typical student with Attention-Deficit/Hyperactivity Disorder (ADHD) in higher education. ADHD is described in the Diagnostic and Statistical Manual of mental disorders (DSM-5; American Psychiatric Association [APA], 2013) as a neurodevelopmental disorder which is characterised by a relatively stable pattern of impairing symptoms of inattention, hyperactivity and/or impulsivity. Thomas is not the only student with ADHD in higher education. Research already shows that there is an increase in the number of students with disabilities in general, and students with ADHD in particular, who are enrolling in higher education (DuPaul, Weyandt, O'Dell, and Varejao 2009). According to the 2014 annual report of the University of Leuven (Belgium), the number of students with a disability enrolling in higher education increased by 6% in comparison to the year before (University of Leuven 2014). This trend was noticeable in the last 10 years within the University. One of the largest groups of students with a disability enrolling in higher education are students with a psychiatric disorder, including students with ADHD (University of Leuven 2014). Overall, it is presumed that approximately 2 to 8% of all students in higher education experience symptoms associated with ADHD (DuPaul et al. 2009).

Despite the increasing number of students with ADHD enrolling in higher education, their chances of graduation remain low. The literature suggests that students with ADHD are more likely to repeat classes, obtain lower grade point averages, and are more likely to drop out of higher education without a degree in comparison to students without a disability (Advokat, Lane, and Luo 2011; Antshel et al. 2011; DuPaul et al. 2009). These indicators of performance in higher education may result from various problems such as attention or executive functioning problems that students with ADHD experience in higher education. In this study, the term ‘functioning and participation problems’ is used to refer to the broad diversity of ADHD-related problems. Previous research has already mapped the functioning and participation problems of students with ADHD in higher education (Weyandt and DuPaul 2008). More recently, the reciprocal relationship between these problems and between personal and environmental characteristics has been stressed in a literature review: Emmers, and colleagues (2016) used the International Classification of Functioning, Disability and Health (ICF; World Health Organisation [WHO] 2001) to determine various functioning and participation problems (See Figure 1) that have an impact on the academic functioning of students with ADHD in higher education. This ICF framework has a broad scope on the functioning of individuals and includes both personal as well as environmental characteristics.

Figure 1. Functioning and participation of students with ADHD in higher education according to the ICF framework (Emmers, Jansen, et al., in press).

Firstly, it is shown that students with ADHD can encounter problems with executive functions such as organising and planning, time management, working memory, cognitive flexibility and inhibition (e.g., Barkley & Murphy, 2011; Reaser, Prevatt, Petscher, and Proctor, 2007). Secondly, students with ADHD have problems with sustained and focused attention, completing tasks and experience frequent daydreaming, hyperactivity and impulsivity (e.g., Weyandt & DuPaul, 2008). Finally, students with ADHD can face other problems, such as problems with selecting main ideas and prioritizing, social functioning or motor coordination (e.g., Reaser et al., 2007; Weyandt et al., 2013). Research on these various functioning and participation problems is to a large extent fragmented. Because of this, knowledge regarding the frequency and the relative impact of these experienced functioning and participation problems on the academic success, measured in one sample, is unavailable. In this perspective, Baverstock and Finlay (2003) also mentioned that general practitioners or student counsellors

have little knowledge regarding ADHD and the support for students with ADHD in higher education. This study aims to fill this gap in literature.

Secondly, previous studies have mainly focused on the personal characteristics (i.e., the functioning and participation problems) of students with ADHD in higher education. However, it remains unclear how often and under which environmental circumstances these problems occur in higher education (see Figure 1; Kettler, 2012). Research on learning disabilities already revealed that external or environmental characteristics can cause difficulties for students with a disability in higher education (Denhart, 2008). Environmental characteristics of an institution of higher education can be situated on different levels, for example the policy of the institution, the pedagogic competences of the lecturers, but also the methods used to educate students. All European institutions of higher education use the European Credit Transfer System (ECTS) to describe the various, standardized methods lecturers can use in their colleges. Because of their direct impact on the learning environment of students and because of their comparability between (European) institutions of higher education, these teaching and evaluation methods will be examined. Other environmental characteristics, such as institutional policy or the number of students attending a course can influence the academic functioning of students with ADHD but have a more indirect link to the individual students with ADHD.

As a first step towards an improvement in academic functioning, both the personal (e.g., functioning and participation problems) and environmental (e.g., teaching and evaluation methods) characteristics have to be investigated. Based on this information, support can be tailored to the needs of the students with ADHD in higher education. In the setting of higher education, reasonable accommodations are often selected as adjusted measure of support for these students with ADHD (Kettler, 2012). Additionally, Reaser and colleagues (2007) already suggested that it is important that reasonable accommodations or adjustments respond to the experienced functioning and participation problems in higher education. Reasonable accommodations are defined by Harrison and colleagues (Harrison, Bunford, Evans, & Owens, 2013, p. 6) as *“changes to practices in schools that hold a student to the same standard as students without disabilities, but provide more benefit to students with a disability (i.e. differential boost) to mediate the impact of the disability on access to the general education curriculum”*. It is assumed that well-adjusted and effective reasonable accommodations are needed to enhance the academic achievement and to provide equal participation chances for students with ADHD in higher education but also to improve the outcomes of these students in further life (e.g., Kettler, 2012). Institutions of higher education have been obligated to offer these reasonable accommodations to students with ADHD after ratifying for instance the UN

Convention on the Rights of Persons with Disabilities (2006) or the Americans with Disabilities Act (ADA, 1990).

Despite this obligation, research on the effectiveness of reasonable accommodations is scarce. The few studies that do examine the effectiveness of reasonable accommodations use a methodological design that cannot generate ADHD-specific conclusions as the participating students with ADHD are often included in a broader group of students with emotional or behavioural problems (e.g., Harrison et al., 2013). Also, the existing literature often focuses on students with ADHD in primary or secondary education (e.g., Hart et al., 2011; Pariseau et al., 2010). In view of the developmental trajectory of ADHD symptoms, it is unclear whether these results can be transferred to students with ADHD in higher education. Additional research including only students with ADHD in higher education is needed in order to guide student counsellors and educators towards implementing effective reasonable accommodations adjusted to the target group (Harrison et al., 2013).

Therefore, three research questions were addressed in this study. Firstly, we examined how frequent the different functioning and participation problems described in the review by Emmers et al. (2016) occurred for students with ADHD in higher education and whether these problems are ADHD-specific. Hereto, three groups of informants were recruited to compare the results of the students with ADHD to the data of students without a disability and student counsellors. Secondly, we researched during which teaching and evaluation methods these functioning and participation problems emerged. Finally, we investigated which reasonable accommodations were perceived to be most effective in dealing with the functioning and participation problems of students with ADHD in higher education. The last two research questions were answered based on the reports of the participating students with ADHD.

Method

Participants

Students with ADHD, students without a disability and student counsellors were recruited to participate in this study. Student counsellors are professional coaches in higher education who emotionally and practically support students with a disability in general and with ADHD in specific. For instance, these counsellors help students with ADHD with planning and select and implement reasonable accommodations. Students with ADHD were included as a target group to gain insight in their own experience regarding the three research questions. Students

without a disability were recruited to examine whether the functioning and participation problems are ADHD-specific, while student counsellors were included to provide a general perception on the functioning and participation problems of the average student with ADHD in higher education. The insights of student counsellors and the answers of the students without a disability were compared to the data of the students with ADHD at the group level (i.e., research question 1).

Students with ADHD could participate in the survey research when (1) they were enrolled in an institution of higher education in Flanders (2) they were diagnosed with ADHD by a psychiatrist (and his/her multidisciplinary team), and (3) they used reasonable accommodations in higher education. In order to receive reasonable accommodations, students had to follow a formal procedure, including that students had to prove their particular condition(s). Hereto, students handed in a diagnostic report to the student counsellor, who would then validate whether this report was provided by a psychiatrist (and his/her multidisciplinary team) and if it showed that the student met the criteria for ADHD described in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013).

Students without a disability were eligible to participate when (1) they were enrolled in an institution of higher education in Flanders, and (2) they had no known disability. Student counsellors were included in the survey when (1) they were working as a student counsellor in an institution of higher education in Flanders, and (2) they were supporting students with ADHD as part of their counselling assignment.

In total, 86 students with ADHD, 42 student counsellors and 250 students without a disability participated in this study. From these 250 students without a disability, 86 were matched to the 86 students with ADHD based on three characteristics. Firstly, the two groups of students were matched on gender and the number of years they were enrolled in higher education. In total, 51 students with ADHD and 51 without a disability were female (59.3%). The students with ADHD and the students without a disability were enrolled in higher education for approximately 3 years (ADHD: $M = 3.31$, $SD = 1.91$; without a disability: $M = 3.26$, $SD = 1.72$; $t(170) = .21$, $p > .05$). Secondly, the aim was to match the students with ADHD and students without a disability based on their enrolment in a professional or academic educational program. However, the groups differed significantly with respect to this characteristic ($\chi^2(1) = 31.86$, $p < .01$), indicating that significantly more students with ADHD in our sample were enrolled in an academic educational program ($n = 43$, 50.0%) than students without a disability ($n = 9$, 10.5%) and matching was not possible. Therefore, it was decided to match the two samples based on their enrolment in an educational program group (i.e., (1) Humanities and

Social Sciences, (2) Science, Engineering, and Technology, and (3) Biomedical Sciences). At group level, most of the students were enrolled in the group Humanities and Social Sciences (ADHD: $n = 59$, 68.6%; without a disability: $n = 58$, 67.4%) and Science, Engineering, and Technology (ADHD: $n = 24$, 27.9%; without a disability: $n = 18$, 20.9%; $\chi^2(2) = 4.64$, $p > .05$).

When comparing the students in the two groups, no significant difference were found in the number of years that the students were enrolled in their current institution of higher education (ADHD: $M = 2.66$, $SD = 1.79$; without a disability: $M = 2.27$, $SD = 1.11$; $\chi^2(7) = 8.39$, $p > .05$) and regarding the year of the educational program they were attending ($\chi^2(12) = 19.51$, $p > .05$). On average, the participating students were enrolled in the second or third year of the Bachelor program. In line with the expectations, no gender differences were found with regard to characteristics related to the enrolment in higher education (e.g., the number of females and males enrolled in a professional or academic educational program or the number of years students were enrolled in higher education), except for the enrolment in different program groups (University of Leuven, 2014). Confirming previous data (University of Leuven, 2014), it was concluded that female students were enrolled significantly more in the group of Humanities and Social Sciences (ADHD: $n = 42$; without a disability: $n = 42$) than male students (ADHD: $n = 16$; without a disability: $n = 16$; $\chi^2(2) = 13.29$, $p = .001$).

The student counsellors were mainly female ($n = 35$; 83.3%). They had between one and 22 years of experience as a student counsellor in higher education ($M = 10.74$, $SD = 7.51$). One student counsellor (2.4%) worked at a university, while the other 41 student counsellors were employed in six different university colleges (96.6%).

Procedure

Students with ADHD, students without a disability, and student counsellors were recruited in seven different institutions of higher education in Flanders. The student counsellors received an e-mail with an information letter explaining the design and goals of the study and an invitation to participate. Additionally, the student counsellors were asked to send this information letter to students with ADHD, who were registered as a student with a disability, and to students without a disability in their institution of higher education. Students without a disability were also recruited via social media and during lectures. If students with ADHD, students without a disability or student counsellors were interested in participating, they were asked to contact the researcher. All participants received, read and signed an informed consent

if they agreed to join the study. The study was approved by the ethical committee of the department of Applied Psychology, Thomas More University College.

Measures

A survey was constructed to examine the three research questions. This survey was administered online using Qualtrics software and took about forty minutes to complete for students with ADHD. Because students without a disability and student counsellors only had to answer the questions related to the first research question, the survey took about twenty minutes to complete for these two groups of informants. The three components of the survey examined the functioning and participation problems of students with ADHD, the teaching and evaluation methods during which they experienced these problems, and the effectiveness of reasonable accommodations.

Functioning and participation problems. Seventeen different functioning and participation problems, found in a recent literature review, were included in a survey (Emmers et al., 2016). The frequency of occurrence of these 17 different functioning and participation problems was examined. Students with ADHD, as well as students without a disability were asked whether or not they experienced each specific problem in higher education (e.g., “*I experience impairing problems with sustaining and focusing my attention*”). Students could answer each question with yes or no. Additionally, student counsellors were asked the extent to which the average student with ADHD experienced each functioning and participation problem in higher education (e.g., “*Students with ADHD experience impairing problems with sustaining and focusing their attention*”) on a scale from 1 (totally not present) to 10 (always present). If the answer of the student counsellor was equal to or larger than 5, the answer counted as a ‘Yes’-answer in order to calculate frequencies. A panel of five academic and professional ADHD-experts was invited by the authors to verify the transparency of each question for students with ADHD in higher education.

Teaching and evaluation methods. When students with ADHD reported a specific problem in higher education (i.e., when they had given a ‘Yes’-answer), they were asked during which teaching and evaluation methods this problem emerged (e.g., “*During which types of teaching and evaluation methods do you experience this problem with sustaining and focusing attention?*”). The students were given 14 different teaching and evaluation methods for each experienced problem, which were described in the ECTS, for example a lecture or a closed book examination. An overview of these methods can be found in the results section (Table 3).

The description of each of these methods was listed in Supplemental file 1. For each functioning and participation problem, the students had to tick off during which types of methods they experienced a specific problem. It was possible to tick off multiple methods.

Effective reasonable accommodations. For each experienced functioning and participation problem, a number of reasonable accommodations used by students with ADHD were pre-determined through a literature search (e.g., Harrison et al., 2009). Afterwards, the expert panel was invited to appoint the reasonable accommodations to specific functioning and participation problems, taking the specific objective of each reasonable accommodation into account. For example, the functioning and participation problem ‘planning and organising’ was linked to the following reasonable accommodations: extended examination duration (i.e., to compensate the difficulty with planning during an exam) or visual time indication (i.e., to help students with time management). This list of reasonable accommodations, combined with specific functioning and participation problems, was presented to students with ADHD. Firstly, students had to indicate if they were offered a particular reasonable accommodation to deal with a specific problem (e.g., “*Was extended examination duration offered to you to deal with your impairing problem with planning and organising?*”). Secondly, all students with ADHD had to rate the experienced (when they used the accommodation) or expected effectiveness (when they did not use it) on a 5-point Likert scale (1: very ineffective to 5: very effective). Finally, if students with ADHD used reasonable accommodations that were not listed in the survey, they could add these accommodations and rate their experienced effectiveness. However, only two students with ADHD added a reasonable accommodation and rated the experienced

. As a rule of thumb, a cut-off score of 3 out of 5 for perceived effectiveness of a reasonable accommodation was used. Additionally, at least 10% or more students with ADHD had to rate the perceived effectiveness.

Analyses

Descriptive statistics. Frequencies were used to analyse the functioning and participation problems (i.e., research question 1), while frequencies, ranges, means and standard deviations were adopted to analyse the perceived effectiveness of reasonable accommodations (i.e., research question 3). Finally, chi square statistics were used to compare data from students with ADHD with the data of the student counsellors and students without a disability with respect to the first research question.

Two mode partitioning. Two mode partitioning was used to gain insight into the probability with which the functioning and participation problems of students with ADHD emerged during the teaching and evaluation methods (i.e., research question 2). Specifically, since both the functioning and participation problems and the teaching and evaluation methods contained a large number of items, the number of items was reduced by simultaneously clustering both variables using two mode partitioning. In this approach, two functioning and participation problems are assigned to the same cluster, if they show up equally likely during the teaching and evaluation methods. Similarly, two methods are classified in the same cluster, if they elicit the different functioning and participation problems to a similar extent (Schepers & Hofmans, 2009). In this study, the number of clusters in the solution had not previously been determined. Therefore, we looked at different models and selected one based on interpretability on the one hand, and goodness-of-fit versus the complexity balance on the other hand (i.e., using the CHull procedure; Schepers, Ceulemans, & Van Mechelen, 2008). Next, the two mode partitioning yields a so-called core matrix which reflects the strength of the relationship between each cluster of problems and each cluster of methods. In the literature, no rule of thumb had been described to interpret these core values. Here, we decided to interpret these values in terms of a probability. This means that, if the core value is .50, students with ADHD have a 50 percent chance of experiencing this specific cluster of functioning and participation problem during the specific cluster of teaching and evaluation methods.

Results

Functioning and participation problems

The results regarding the frequency of experienced functioning and participation problems can be found in Table 1.

The results showed that the most frequently experienced functioning and participation problems by ADHD-students in higher education were problems with sustaining and focusing attention, frequent daydreaming, difficulty completing tasks, and difficulty planning and organising. When comparing the answers of the student counsellors to the results of the students with ADHD, two significant differences were found. The frequency of difficulty sitting still ($\chi^2(1) = 4.96, p < .05$) and impulsivity problems ($\chi^2(1) = 4.04, p < .05$) were rated higher by student counsellors than by students with ADHD themselves. However, students with ADHD and student counsellors were consistent in reporting the frequency of occurrence of all other

functioning and participation problems. Furthermore, students without a disability experienced all functioning and participation problems significantly less frequently than students with ADHD except for losing things ($\chi^2(1) = 3.30, p > .05$) and having few or no friends ($\chi^2(1) = .012, p > .05$), indicating that these two functioning and participation problems occurred to the same extent in both groups of students.

Table 1

Functioning and participation problems of students with and without ADHD according to the students and student counsellors

	Students with ADHD		Students without ADHD		Student counsellors	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Sustained and focused attention problems	69	95.8	46	53.5	40	95.2
Daydreaming	51	79.7	45	53.6	27	75.0
Difficulty completing tasks	47	71.2	33	38.8	29	80.6
Difficulty planning and organising	41	70.7	37	44.6	27	79.4
Internal restlessness	40	63.5	22	26.2	20	55.6
Impulsive behaviour ^a	35	55.6	22	26.2	27	75.0
Making careless mistakes	31	55.4	20	23.8	18	56.3
Difficulty prioritizing	30	52.6	19	22.9	19	57.6
Forgetful	29	51.8	24	28.6	15	50.0
Working memory problems	25	43.1	12	14.5	17	50.0
Difficulty following instructions	19	33.9	3	3.6	15	48.4
Losing things ^b	19	33.9	17	20.2	11	36.7
Difficulty with cognitive flexibility	18	30.5	3	3.6	16	45.7
Difficulty with coordination	20	31.7	2	2.4	12	34.3
Not listening when being spoken to	20	30.3	10	11.8	12	33.3
Difficulty sitting still ^a	19	30.2	6	7.1	19	52.8
Few or no friends ^b	3	5.4	4	4.9	3	10.0

^a Significant difference between students with ADHD and student counsellors ($p < .05$).

^b Non-significant difference between students with and without ADHD ($p > .05$).

Functioning and participation problems during teaching and evaluation methods

The two mode partitioning yielded a model with 4 clusters of functioning and participation problems (Table 2) and 5 clusters of teaching and evaluation methods (Table 3). This model accounted for 82.99% of the variance in how often particular problems showed up during specific methods.

The core values that displayed the strength of the relationship between each cluster of functioning and participation problems with each cluster of teaching and evaluation methods are shown in Table 4. According to the results, the chances of experiencing attention problems (probability = .82), regulation problems (probability = .70), social problems (probability = .67), and inefficient study skills (probability = .58) was highest during classical teaching methods. Additionally, students with ADHD also had a high chance of experiencing attention problems and inefficient study skills during classical evaluation methods (probability = .69 and .65) while there was a high chance of encountering social problems when writing a thesis (probability = .67). The chances of experiencing attention problems, regulation problems, and inefficient study skills was lowest during the activating teaching methods (probabilities respectively .31, .23, and .21). Other results can be consulted in Table 4.

Table 2

Clusters of functioning and participation problems

Cluster 1	Cluster 2	Cluster 3	Cluster 4
Attention problems	Inefficient study skills	Regulation problems	Social problems
Problems sustaining and focusing attention	Difficulty with completing tasks	Impulsive behaviour	Few or no friends
Daydreaming	Difficulty planning and organising	Losing things	
Internal restlessness	Difficulty following instructions	Difficulty sitting still	
Difficulty prioritizing	Making careless mistakes	Problems with cognitive flexibility	
Forgetfulness		Not listening when being spoken to	
Working memory problems		Difficulty with motor coordination	

Table 3

Clusters of ECTS teaching and evaluation methods

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Classical teaching methods	Activating teaching methods	Classical evaluation methods	Alternative evaluation methods	Thesis
Lecture	Excursion	Writing a paper	Oral exam	Bachelor or master thesis
Practical	Internship	Closed book exam	Practical exam	
	Self or peer evaluation	Open book exam	Portfolio	
	Process evaluation	Multiple choice exam		

Table 4

Core values of the two mode partitioning

	Classical teaching methods	Activating teaching methods	Classical evaluation methods	Alternative evaluation methods	Bachelor or master thesis
Attentional problems	0.82	0.31	0.69	0.49	0.49
Inefficient study skills	0.58	0.21	0.65	0.48	0.45
Regulation problems	0.70	0.23	0.40	0.34	0.25
Social problems	0.67	0.00	0.08	0.00	0.67

Effective reasonable accommodations

The perceived effective reasonable accommodations for each functioning and participation problem were listed in Table 5. Five functioning and participation problems, namely losing things (cluster 1), not listening when being spoken to (cluster 1), daydreaming (cluster 3), internal restlessness (cluster 3), and having less or no friends (cluster 4), were not included in the table since no effective reasonable accommodations were found to deal with these problems.

Within the cluster ‘attention problems’, effective reasonable accommodation were identified by students with ADHD for four functioning and participation problems (see Table 5). For three out of four functioning and participation problems, the reasonable accommodation extended examination duration was reported as the most effective. Besides this effectiveness, ADHD students with attentional problems also reported this accommodation as most used ($n = 92.8\%$). For students who experienced themselves as being forgetful only one effective reasonable accommodation, namely alternative examination format (i.e., changing a written examination into an oral exam), was defined. However, only a small group of students reporting forgetfulness (20%) used this accommodation, meaning that this result cannot be generalized for all students with ADHD.

Within the cluster ‘inefficient study skills’, effective reasonable accommodations were mentioned for all four functioning and participation problems (see Table 5). Extended examination duration was perceived to be effective in dealing with all four functioning and participation problems. Additionally, examination deferral was shown to be most effective for students who experienced problems with planning and organising. Other effective reasonable accommodations were identified for each functioning and participation problem and can be found in Table 5.

The results of the cluster ‘regulation problems’ showed that for each functioning and participation problem only one or two effective reasonable accommodations were reported (see Table 5). For example, students with ADHD who experienced impulsive behaviour perceived an alternative examination format as effective.

Finally, students with ADHD, who encountered a specific functioning and participation problem but did not use a specific reasonable accommodation had to rate the expected effectiveness of each reasonable accommodation. It was shown that the expected effectiveness was typically lower than the experienced effectiveness of students with ADHD who did use the reasonable accommodation. Significant differences were marked in Table 5 using an asterisk (*).

Table 5

Effective reasonable accommodations for the functioning and participation problems within each cluster

Attentional problems		<i>N</i> used (%)	<i>M</i> (<i>SD</i>) Experienced ^a	Range	<i>M</i> (<i>SD</i>) Perceived ^b
Sustaining and focusing attention problems	Extended examination duration	64 (92.8)	4.44 (1.04)	1-5	3.60 (1.34)**
	Designated seat during examination room	13 (18.8)	4.15 (1.07)	2-5	2.32 (1.30)***
	Visual time indication	35 (50.7)	4.03 (1.07)	1-5	3.68 (1.47)
	More time for tasks	11 (15.9)	4.00 (1.34)	1-5	3.29 (1.50)
	Taking the examination in smaller groups	19 (27.5)	3.68 (1.38)	1-5	2.60 (1.51)
	Using a computer during lectures	21 (30.4)	3.43 (1.29)	1-5	2.31 (1.26)*
	Recording the lecture	19 (20.3)	3.29 (1.14)	2-5	2.76 (1.49)*
Difficulty prioritizing	Extended examination duration	28 (93.3)	4.57 (.84)	2-5	1.00 (0.00)***
	Oral explanation	9 (30.0)	4.33 (.87)	3-5	3.29 (1.45)
	Alternative examination format	7 (23.3)	3.37 (1.40)	1-5	2.61 (1.53)
Forgetful	Alternative examination format	6 (20.7)	3.33 (1.37)	1-5	2.86 (1.46)
Working memory problems	Extended examination duration	24 (96.0)	4.79 (.51)	3-5	3.00 (/)**
	Examination deferral	10 (40.0)	4.40 (1.27)	1-5	3.60 (1.06)*
	Using a computer	5 (20.0)	3.40 (1.52)	1-5	2.25 (1.07)
Inefficient study skills					

Difficulty completing tasks	Extended examination duration	41 (87.2)	4.54 (.84)	1-5	2.33 (1.63)***
	Taking the examination in smaller groups	14 (29.8)	4.23 (1.09)	2-5	2.35 (1.37)**
	Oral explanation	13 (27.7)	3.71 (1.20)	1-5	3.18 (1.45)
	Using a computer during lectures	14 (29.8)	3.64 (1.34)	1-5	2.39 (1.30)**
Planning and organising	Examination deferral	12 (29.3)	4.58 (.67)	3-5	3.79 (1.37)
	Extended examination duration	40 (97.6)	4.50 (.91)	1-5	1.00 (0.00)***
	Visual time indication	25 (61.0)	4.16 (.99)	2-5	3.13 (1.63)*
	Support from student counsellor	17 (41.5)	3.88 (1.11)	2-5	3.67 (1.27)
Difficulty following instructions	Extended examination duration	18 (94.7)	4.22 (1.11)	1-5	3.00 (/)
	Oral explanation	5 (26.3)	3.40 (1.34)	2-5	3.00 (1.62)
Making careless mistakes	Extended examination duration	31 (100.0)	4.29 (1.10)	1-5	/
	Oral explanation	9 (29.0)	4.22 (.83)	3-5	3.18 (1.53)
	Alternative examination format	6 (19.4)	3.83 (.98)	3-5	2.80 (1.44)
Regulation problems					
Impulsive behaviour	Alternative examination format	6 (17.1)	4.17 (1.17)	2-5	2.59 (0.27)
Difficulty sitting still	Taking the examination in smaller groups	6 (31.6)	4.50 (0.22)	4-5	3.00 (0.39)
Difficulty with cognitive flexibility	Using a computer during lectures	8 (44.4)	3.63 (1.77)	1-5	2.60 (1.51)
	Using a computer during lectures	8 (40.0)	3.00 (1.60)	1-5	2.50 (1.17)

Difficulty with motor coordination	Using a computer during exams	4 (20.0)	3.00 (1.41)	1-4	2.44 (1.41)
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^a Perceived effectiveness rated by students with ADHD who used the reasonable accommodation to deal with the specific functioning and participation problem.

^b Expected effectiveness rated by students with ADHD who did not use the reasonable accommodation but did experience the specific functioning and participation problem.

*Significant difference between the experienced and perceived effectiveness of an accommodation ($p < .05$)

**Significant difference between the experienced and perceived effectiveness of an accommodation ($p < .01$)

***Significant difference between the experienced and perceived effectiveness of an accommodation ($p < .001$)

Discussion

This study examined three research questions, namely (1) how frequent the different functioning and participation problems occurred for students with ADHD in higher education and if these problems are ADHD-specific, (2) during which teaching and evaluation methods these problems emerged, and (3) which reasonable accommodations were perceived to be most effective in dealing with the functioning and participation problems of students with ADHD in higher education. In order to examine the first research question, students with ADHD, student counsellors, and students without a disability participated in a survey research. The recruitment of three groups of informants allowed us to compare the answers of students with ADHD with the perception of student counsellors and to the occurrence of the functioning and participation problems in a general sample of students without a disability. The other two research questions were answered by students with ADHD only. Students with ADHD were diagnosed by a psychiatrist or a multidisciplinary team including a psychiatrist. This meets the Belgian and several international guidelines which stipulated that the psychiatrist coordinates the diagnostic research in cooperation with a multidisciplinary team consisting of a psychologist, a physical therapist and a speech therapist amongst others (NICE, 2008; Superior Health Council, 2013). This multidisciplinary team, supervised by a psychiatrist, is primarily needed because of the high chances of co-occurring disorders for individuals with ADHD (e.g., OCD, learning disabilities; Gilbert, 2005; Weyandt & DuPaul, 2006).

With respect to the first research question, it was concluded that, on a group level, students with ADHD primarily experienced problems with sustaining and focusing attention, frequent daydreaming, completing tasks, and planning and organising. These findings were consistent with literature regarding this topic (e.g., DuPaul et al., 2009).

Furthermore, two significant differences were found between the reports of students with ADHD and student counsellors. Student counsellors rated the occurrence of difficulty sitting still and impulsive behaviour significantly more frequent than students with ADHD. On the one hand, this may indicate that student counsellors have little knowledge about the developmental perspective of ADHD symptoms, namely that impulsivity and hyperactivity decreases and attention problems remain stable when aging (e.g., Rao, 2004). On the other hand, it is possible that students with ADHD lack self-insight and self-knowledge and tend to underreport the severity of their impairment (e.g., Kooij et al., 2008).

Moreover, no differences between students with ADHD and without a disability were found for social problems (i.e., having few or no friends) and for losing things. This result could

mean that students with ADHD are equal to students without a disability with regard to experiencing these problems in higher education and these problems are not ADHD-specific. However, it is also possible that the students with ADHD underreported the severity of the problems. Another explanation could be that by the time these students enrol in higher education, they learned how to cope with these difficulties (for example by interacting properly, by making lists, putting everything in the same place, etc.) through intervention programs. Unfortunately, no information regarding previous treatment was obtained during this study. With respect to the other functioning and participation problems, it became clear that students with ADHD do experience these problems significantly more frequently than students without a disability.

To answer the second research question, the functioning and participation problems were firstly clustered in four groups. These clusters are in line with the literature, where attentional problems are always discussed as one large group of impairing symptoms of ADHD, as well as symptoms of hyperactivity and impulsivity (regulation problems) and study skills (e.g., APA, 2013; Weyandt & DuPaul, 2008). The fourth group, namely social problems, was separated in a cluster, probably because of the low frequency of occurrence in comparison to other problems. Secondly, the teaching and evaluation methods were clustered into five groups. Consistent with literature (e.g., Struyven, Dochy, & Janssens, 2008), classical and activating teaching methods were separated. It became clear that the probability of experiencing problems was highest during classical teaching and evaluation methods, except for the low chance of experiencing social problems during classical evaluation methods. These classical teaching and evaluation methods are implemented very frequent in higher education, hereby increasing the chances for students with ADHD to encounter problems. At the same time, it was shown that the probability of experiencing problems during alternative evaluation methods and during activating teaching methods was lower. This is in line with previous literature regarding students with ADHD in primary and secondary education suggesting that the performance of these students increases when they can participate actively (e.g., Farrell, 2008).

Lastly, the students with ADHD rated the effectiveness of reasonable accommodations. It was concluded that the implementation of reasonable accommodations is important as each student with ADHD rated at least one reasonable accommodation as effective and thus helpful in dealing with their specific functioning and participation problems. In line with previous research, it has been shown that extended examination duration is most used by the included students with ADHD in this study (e.g., Kettler, 2012). In addition, this reasonable accommodation was also perceived as most effective to deal with the majority of functioning

and participation problems. As indicated by the wide range of the effectiveness scores, not all students experiencing a specific problem perceived one and the same reasonable accommodations as effective. This should be taken into account when offering reasonable accommodations to students with ADHD. As expected, the results also indicated that not all functioning and participation problems could be neutralized by using reasonable accommodations.

When finally looking at the expected effectiveness scores of students with ADHD, it was found that students with ADHD, who did not use a specific reasonable accommodation, assumed that it would not be helpful for them. Research has already suggested that students have a hard time imagining if and which accommodations would be helpful because they receive inadequate or insufficient information regarding these accommodations (Magnus & Tøssebro, 2014). In addition, the perceived effectiveness of accommodations is influenced by the perception and attitude of the student counsellors, the faculty or institution of higher education (Hong & Himmel, 2009). Furthermore, research already suggested that students with ADHD refuse reasonable accommodations because they are afraid of being stigmatized by peers or want to succeed on their own (e.g., Denhart, 2008). Alternatively, it is also possible that reasonable accommodations were well adjusted to the personal characteristics of the students with ADHD and the environmental characteristics of the institution of higher education and thus would not be effective for these specific students with ADHD.

Limitations

We recognize that this study has its limitations. Firstly, using a two mode partitioning results in a reduction of data but also in a loss of detail. However, this statistical analysis was used to make the data more manageable and to provide a general insight into when these functioning and participation problems occur in higher education. It does not imply that the details were not important and that student counsellors do not have to take the individual differences between students with ADHD into account.

Secondly, only teaching and evaluation methods were selected to represent environmental characteristics that could impact the functioning and participation of students with ADHD in higher education. No (other) higher level variables were included in this study (e.g., participation rate in higher education, social inclusion, policy of the institution). However, this does not imply that these variables are not important. Future research should also focus on other

environmental and personal characteristics, for example level of participation, and academic integration.

Thirdly, reasonable accommodations were listed in the results section if 10% or more students with ADHD rated the experienced effectiveness (and thus used the reasonable accommodation) in order to avoid a too low sample size. This entailed that some reasonable accommodations were removed from the results because only one or two students used the reasonable accommodation, regardless of whether the accommodation was perceived as effective or not. As stated previously, the effectiveness of reasonable accommodations is very individual. Therefore, it is important for student counsellors to also take into account other, not listed reasonable accommodations.

Finally, students with ADHD were asked for their subjective opinion whether or not the used reasonable accommodation is effective. Future research needs to indicate whether reasonable accommodations also have an objective positive effect on the test scores of students with ADHD in higher education as is suggested by Miller, Lewandowski and Antshel (2015). Additionally, in order to gain insight into the effectiveness of reasonable accommodations, researchers should focus on why students with ADHD reported that some reasonable accommodations were effective while others were not used and were presumed to be not helpful for them. This way, reasonable accommodations could be selected more carefully and students with ADHD could have equal chances in higher education.

Implications for practice

The results of this study have many practical implications. It was shown that students with ADHD can experience various functioning and participation problems and that these problems vary between students with ADHD. During a first counselling session between the student with ADHD and their student counsellor, the individual problems of the student should be identified. This first counselling session is critical because students with a disability can feel misunderstood (Denhart, 2008). Student counsellors should be aware of this issue when talking to students with a disability and avoid presumptions by asking lots of questions and checking their interpretations during the entire session. In addition, it is important that student counsellors also acknowledge the strengths of students with ADHD and integrate these strengths in the support they offer these students in higher education. Secondly, it is important to make an inventory of the teaching and evaluation methods of the educational program of the student with ADHD.

Based on these two parameters, student counsellors can propose reasonable accommodations that can be effective for the individual student with ADHD. Reasonable accommodations that can be offered within a specific institution should be listed during an open dialogue between student counsellors, policy makers, representatives of students and the director of the institution. The proposed reasonable accommodations should then be discussed with the student with ADHD in order to choose the accommodations that were perceived to be effective to deal with specific functioning and participation problems, as was shown in this study. Student counsellors should be aware of the fact that external factors, such as the perception of other students or the fear of being misunderstood, could be the reason why students with ADHD are reluctant to use reasonable accommodations (Denhart, 2008). The effectiveness of reasonable accommodations should be emphasized by student counsellors in order to increase the chances of success for students with ADHD. Alternatively, research suggested that coaching or peer-based support can be useful when students with ADHD are reluctant to use reasonable accommodations because they want to be able to succeed on their own. These coaching sessions enhance the competences, executive functioning and general self-efficacy of students with ADHD in higher education (Parker & Boutelle, 2009; Zwart & Kallemayn, 2001).

Because of the large range of effectiveness scores, and in line with previous research, it should always be kept in mind that the effectiveness of reasonable accommodations cannot be generalized for all students with a specific disability and that reasonable accommodations should be selected based on the individual needs of the student (e.g., Sireci, Scarpati, & Li, 2005). Therefore, student mentors should be open to evaluate and reconsider the implemented reasonable accommodations if the individual student with ADHD reports that the accommodations are not working for them.

Additionally, student counsellors could promote the use of the principles of Universal Design for Learning (UDL) to teachers and professors (CAST, 2008). The use of these principles could help students with ADHD but also students without a disability by providing equal opportunities to learn. UDL states that teachers and professors could adapt to the diversity within the group of students by using multiple means of representation, expression and engagement (CAST, 2008). For example, by adding visual cues in the lecture or giving a short break, students with ADHD could stay more focused and learn more during the lecture.

Finally, it is possible that additional support, within or outside the educational context should be considered if reasonable accommodations are not sufficient. Examples of additional

support are psycho-education, psychopharmacological treatment or psychosocial interventions such as planning and organisation training (Boyer, Geurts, Pier, & Van der Oord, 2014).

In summary, this study has presented the hypothesis that students with ADHD frequently face various functioning and participation problems in higher education. It was also shown that the occurrence of a problem is dependent on the used teaching and evaluation methods. Finally, results have indicated that reasonable accommodations should be selected based on both personal and environmental characteristics and that the effectiveness of reasonable accommodations is dependent on various factors, namely the experienced functioning and participation problems, the personal preferences of a student with ADHD, and environmental characteristics of the institution. The latter conclusion is important for student counsellors to take into account when implementing reasonable accommodations and to guide future research that investigates the effectiveness of reasonable accommodations on an objective performance rating (e.g., the test scores).

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