

European Journal of Special Needs Education

ISSN: 0885-6257 (Print) 1469-591X (Online) Journal homepage: www.tandfonline.com/journals/rejs20

Examining the effectiveness of inclusive teaching practices for students with ADHD in post-secondary education: one size does fit all!

Jeanne Lagacé-Leblanc, Elke Emmers, Eva Ceulemans & Dieter Baeyens

To cite this article: Jeanne Lagacé-Leblanc, Elke Emmers, Eva Ceulemans & Dieter Baeyens (02 May 2025): Examining the effectiveness of inclusive teaching practices for students with ADHD in post-secondary education: one size does fit all!, European Journal of Special Needs Education, DOI: 10.1080/08856257.2025.2500133

To link to this article: https://doi.org/10.1080/08856257.2025.2500133

Published online: 02 May 2025.

Submit your article to this journal

Article views: 678

View related articles

View Crossmark data

Citing articles: 1 View citing articles

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=rejs20

EUROPEAN JOURNAL OF SPECIAL NEEDS EDUCATION
https://doi.org/10.1080/08856257.2025.2500133

Routledge
Taylor & Francis Group

Check for updates

Examining the effectiveness of inclusive teaching practices for students with ADHD in post-secondary education: one size does fit all!

Jeanne Lagacé-Leblanc[a], Elke Emmers[b], Eva Ceulemans[c] and Dieter Baeyens[a]

[a]Faculty of Psychology and Educational Science, Parenting and Special Education Unit, KU Leuven, Leuven, Belgium; [b]School of Educational Studies, UHasselt, Hasselt, Belgium; [c]Faculty of Psychology and Educational Science, Quantitative Psychology and Individual Differences Unit, KU Leuven, Leuven, Belgium

ABSTRACT

Although some students succeed in their academic journey without major obstacles, a significant proportion of students with ADHD face considerable academic challenges when exposed to traditional teaching strategies. Despite attempts at reasonable accommodations, the current understanding of effective teaching approaches to alleviate these challenges remains limited. This study aims to identify effective inclusive teaching practices for post-secondary students with ADHD. An online survey including testing 49 inclusive teaching practices was completed by 850 post-secondary students who were officially registered with their academic institution with a functional disability, including 355 students with ADHD. Two-mode partitioning of the 49 inclusive teaching practices and 18 ADHD symptoms revealed a clustering of four inclusive strategy type cluster by one ADHD symptom cluster solution accounting for 88.10% of the variance. This finding suggests that, regardless of ADHD symptomatology, the likelihood of perceiving the four inclusive strategy types of 'flexible', 'emotionally supportive', 'engaging' and 'representational' practices as effective, is high (probability rates between .53 and .89). The current study provides a first insight into effective practices that universally promote academic success for all students with ADHD, despite the heterogeneity of this condition.

ARTICLE HISTORY
Received 19 January 2024
Accepted 25 April 2025

KEYWORDS
ADHD; post-secondary education; teaching practices; universal design; UDL

Introduction :Attention-deficit/hyperactivity disorder in post-secondary education

Attention-deficit/hyperactivity disorder (ADHD) is characterised by pervasive symptoms of inattention and/or hyperactivity/impulsivity that interfere with or reduce the quality of social, academic, or occupational functioning (APA 2013). The prevalence of ADHD among post-secondary students has risen over the past 20 years (Sedgwick-Müller et al. 2022). Post-secondary education includes universities and university colleges. Research indicates that 2% to 8% of college students in the United States report clinically significant levels of ADHD symptoms, with at least 25% of college students with disabilities being diagnosed with ADHD (DuPaul et al. 2009).

CONTACT Elke Emmers elke.emmers@uhasselt.be

© 2025 Informa UK Limited, trading as Taylor & Francis Group

The current study is based on the premise that students diagnosed with ADHD encounter numerous challenges in adjusting to post-secondary education life, in contrast to their non-ADHD counterparts (Weyandt and DuPaul 2013). They find it more difficult compared to those without ADHD to avoid distractions and stay focused, take class note, remember necessary items, persist in cognitively challenging tasks, and think through the consequences of their actions (Advokat, Lane, and Luo 2011; Fleming and McMahon 2012). They also struggle to remain seated during classes and exams or when writing assignments (Gilbert 2005). According to various studies, students with ADHD are more prone to drop out of courses, fail to graduate, or report a diminished quality of life (e.g. Advokat, Lane, and Luo 2011; Pinho et al. 2019). Therefore, it is conceivable that these students may need additional support and actions designed to help them persevere and encourage their tenacity in achieving their academic goals (Emmers et al. 2017).

Support strategies for students with ADHD

The provision of reasonable accommodations is still the prevailing strategy employed in post-secondary education institutions to address the unique requirements of students **with functional limitations, including those** diagnosed with ADHD (reference). This aligns with mandates from the UN Convention on the Rights of Persons with Disabilities (UNCRPD), the UK Equality Act 2010, and EU disability directives, which require that post-secondary institutions implement reasonable accommodations based on functional needs rather than requiring a formal diagnosis (UNCRPD, 2006, Art. 24, Jansen, Petry, Ceulemans, Noens, et al. 2017). This is reasonable since the UN Convention on the Rights of Persons with Disabilities 2006, Art. 24, requires post-secondary institutions to provide and implement reasonable accommodations for disabled students. To promote equal educational opportunities, reasonable accommodations usually include extra time on tests, testing in a separate room, and note-taking assistance (Jansen et al. 2019).

Students with ADHD generally perceive these reasonable accommodations to be effective (Jansen et al., 2019). However, even the most commonly used reasonable accommodations, such as additional time for exams and taking exams in separate rooms, fail to show objective effectiveness in primary, secondary or post-secondary students with ADHD (Baeyens 2021; Jansen et al. 2019; Miller, Lewandowski, and Antshel 2015). Additionally, the approach's fundamentals limit inclusive education. Post-secondary students must disclose their medical status to receive reasonable accommodations. A recent confirmation of their diagnosis, which can often be a lengthy and costly process, is essential for students with disabilities to secure the necessary accommodations in an academic environment. Recent data indicate a growing trend among students to disclose their disabilities, shaped by the impact of social media and changing societal attitudes (Sedgwick-Müller et al. 2022). However, the decision to disclose is often influenced by various factors, including concerns about stigmatisation. Despite the increasing rates of disclosure, numerous students still encounter obstacles, including the significant expenses and logistical difficulties associated with acquiring an updated diagnosis. Furthermore, numerous students do not possess a valid certificate of their diagnosis, struggle to afford a diagnosis, or encounter complicated procedures that obstruct access to essential support (e.g. Lovett, Nelson, and Lindstrom 2015). Due to the wave of democratisation and (mandatory) major international treaties that commit to inclusive

education at all levels of education, post-secondary education institutions aim to offer a learning environment that is accessible to all learners. Consequently, it is important to explore and implement other educational models than reasonable accommodations that can support students with disabilities, including students with ADHD, in their academic trajectories (Roberts, Satlykgylyjova, and Park 2015).

Universal Design for Learning (UDL) has been proposed as a possible solution to address the challenges of accommodating diverse learning in educational settings (Meyer, Rose, and Gordon 2014). The choice of this model is clear given that European policies and research, such as the European Agency for Special Needs and Inclusive Education and the European Centre for the Development of Vocational Training, are increasingly committed to this framework in response to increasingly diverse student groups (European Commission 2010).

Research gap and objectives

The present study uses the UDL framework as its theoretical fundament aimed at designing and delivering flexible approaches to teaching and learning that address student diversity within the classroom context. UDL presents a notable advantage in that it can be easily integrated with other teaching strategies, thereby fostering a dynamic learning environment, and providing a wider range of options for learners (CAST 2018). Research suggests that UDL can meet the different needs of all students and that students favourably react to a variety of UDL strategies. However, the UDL framework has been criticised for lacking actual examples to operationalise its ideas (Kennedy et al. 2018). UDL deployment in post-secondary education classes is currently understudied and methodologically flawed (Seok, DaCosta, and Hodges 2018).

More importantly, the existing literature does not specifically investigate the impact of UDL on students with disabilities to determine the effectiveness of certain practices for individuals having particular conditions such as ADHD (Almeqdad et al. 2023). However, elements of UDL can be discerned in studies that did look at impact or effect. For instance, research conducted by Lipka, Baruch, and Meer (2019) among Israeli post-secondary students with ADHD and learning disability have demonstrated the importance of emotional support, such as feeling that the teacher cares about them, and mentioned tolerance as an important quality in teachers. They also valued teachers who adapted to students' pace, repeated information when necessary, organised learning in small blocks or used modelling learning. Furthermore, when looking specifically for students with ADHD in higher education, the study conducted by Jansen, Petry, Ceulemans, van der Oord, et al. (2017) indicates that the aforementioned students are susceptible to encountering noteworthy challenges in the context of formal instructional sessions. Finally, a recent qualitative study explored the perspectives of 29 post-secondary students with ADHD and 9 counsellors from the institutional Office of Disability Services (ODS) to understand which teaching practices promote academic success for students with ADHD (Lagacé-Leblanc 2021). In-depth interviews revealed 50 specific actions taken by teachers that were perceived to support the academic success of these students. These actions encompass visual support, comprehension assistance, assessment facilitation, time management strategies, information organisation techniques, effective teaching methods, and practices aimed at building relationships with educators. The findings establish the foundation for the 50

inclusive teaching practices outlined in the current study, specifically aimed at supporting students with ADHD in post-secondary education. The present study aims to explore the experiences of post-secondary students with (and without) ADHD to identify effective inclusive teaching practices for this population. It aims to achieve three objectives: (1) to identify key inclusive teaching practices that post-secondary students with ADHD and without ADHD find effective, (2) to explore sets of inclusive teaching practices that would be perceived as effective for specific ADHD symptom clusters, and (3) to determine if variables such as age, gender, education level, and school level influence the perceived effectiveness of inclusive teaching practices.

Method

This study uses a descriptive survey design as the quantitative research methodology, aimed at mapping inclusive teaching practices for students in post-secondary education who have ADHD. The choice of this methodology allows for a structured and comprehensive examination of the teaching practices perceived as effective by our participants. A descriptive survey design is particularly suited to gathering extensive data across a large sample, enabling us to capture a broad view of inclusive practices and to provide detailed insights that can inform the development of inclusive teaching strategies tailored to the specific needs of these students.

Participants

Post-secondary students from seven institutions in Flanders, Belgium (two universities and five university colleges) were recruited through emails sent by the ODS. To participate, students had to be registered at their institution's ODS and provide proof (i.e. recent attestation) of at least one of the following conditions: ADHD, autism spectrum disorder (ASD), learning disabilities (LD), tic disorder, or psychological disabilities (such as mood and anxiety disorders), also known as 'hidden disabilities' (Lovett, Nelson, and Lindstrom 2015). A total of 915 students completed an online survey, of which 65 were excluded due to (a) >20% of missing responses ($n = 61$; Peng et al. 2006), (b) not being officially registered in an ODS ($n = 3$), or c) lacking the required diagnosis ($n = 1$). The final sample consisted of 850 students with disabilities: 355 students with ADHD and 495 students with other hidden disabilities (e.g. dyslexia, anxiety, or learning disabilities), which served as a comparison group.

This comparative context was included to provide insights into the unique challenges and perceptions of students with ADHD, relative to peers with similar but non-ADHD-related disabilities. Among the students with ADHD, 230 had only ADHD, while 125 had ADHD with comorbidities. Table 1 presents demographic data for both groups.

Measures

Participants completed a brief demographic questionnaire including questions about their gender, age, and programme, as well as information related to the participant's disability profile and clinical diagnoses.

The Dutch version of the Adult ADHD Self-Report Scale (ASRS-v1.1) Symptoms Checklist (Baeyens et al. 2012) was used to assess ADHD symptoms, which is a 23-item

Table 1. Sociodemographic characteristics of the students with ADHD ($n = 355$) and students with a functional disability other than ADHD ($n = 495$).

	Students with ADHD n (%)	Students with other functional disability n (%)	X^2	p
Gender*			.255[a]	.614
Female	235 (67.3%)	338 (69.0%)		
Male	114 (32.7%)	152 (31.0%)		
Age group			3.454	.178
17 to 20 years old	156 (43.9%)	221 (44.6%)		
21 to 24 years old	157 (44.2%)	234 (47.3%)		
25 years and older	42 (11.8%)	40 (8.1%)		
School level			31.207	<.001
University	207 (58.3%)	192 (38.8%)		
University college	148 (41.7%)	303 (61.2%)		
Educational level			32.454	<.001
Professional training bachelor	148 (41.7%)	303 (61.2%)		
Academic bachelor	153 (43.1%)	135 (27.3%)		
Master	54 (15.2%)	57 (11.5%)		
Program group			6.621	.038
Humanities and social science	205 (57.7%)	273 (55.2%)		
Science, engineering and technology	81 (22.8%)	148 (29.9%)		
Biomedical sciences	69 (19.4%)	74 (14.9%)		
ADHD symptoms	M (SD)	M (SD)	t	p
ASRS inattention subscale score	5.92 (2.30)	2.58 (2.37)	20.403	<.001
ASRS hyperactivity-impulsivity subscale score	4.75 (2.29)	2.70 (2.03)	13.474	<.001

ASRS = Adult ADHD Self-Report Scale (ASRS-v1.1).

*In support of inclusive language, we used a non-binary gender choice to allow for all gender identifications. 11 students identified themselves as other than female or male. Given their small representation, they were not included in the gender analyses.

[a]N = 839.

questionnaire. The ASRS-v1.1 Symptoms Checklist was developed by the World Health Organization (WHO) workgroup to provide a valid self-assessment of current ADHD symptoms in adults (Kessler et al. 2005). We administered the ASRS v1.1 to provide additional insights into the severity and heterogeneity of ADHD symptoms among participants. Although all students were registered with their ODS and had a confirmed diagnosis, symptom severity can vary significantly among individuals with ADHD. By using the ASRS v1.1, we were able to obtain objective measures of symptom severity, which contributed to a more nuanced understanding of our sample. To facilitate a reliable self-report, the 23 current item scores were recalculated to the original 18 DSM-IV items. More precisely, in the Dutch version, five items from the original version were reformulated in two single statements each (Kooij et al. 2005). An average of the item scores was calculated. The symptom presentation of the questionnaire uses adult-specific language in a self-rated, frequency-based format, with symptoms rated on a 4-point Likert-type scale ranging from 'never or rarely' (0) to 'very often' (3). Symptom was considered as present if the answer given to the item was 'often' or 'very often' (a score of 2 or 3). For the current analysis, if five or more items of the nine inattentive symptoms or of the nine hyperactive/impulsive symptoms were endorsed, symptom count criteria for ADHD were considered met. The Dutch version of the ASRS-v1.1 has satisfactory to good psychometric values (Baeyens et al. 2012).

Furthermore, the participants assessed the effectiveness of various teaching methods using the inventory of inclusive teaching strategies derived from the Perceived

Effectiveness of Teaching Practices for Students with ADHD in Post-secondary Education. This unvalidated inventory consists of a set of 50 items and was developed based on insights obtained from previous qualitative research conducted by Lagacé-Leblanc, Massé, and Rousseau (2022). This initial exploratory study aimed at documenting teaching practices that promote the academic success of students with ADHD. Scientific rigour has been meticulously applied, and the practices reported by students were thoroughly verified and validated by a research team, who are also experts in education and ADHD. Participants used a 4-point Likert scale to rate their ability to elevate specific educational requirements from 'not effective' (1) to 'very effective' (4). Individuals can mark the item as 'not applicable (N/A)' if the instructional practice does not apply to them. Thus, higher ratings indicate inclusive teaching strategy efficacy.

Procedure

The current study was approved by the Social and Societal Ethics Committee at KU Leuven. Participants were recruited, by email, through post-secondary institutions' ODS from February 2022 to June 2022. Students volunteering to participate in the study were directed to an online information letter and informed consent form. After providing informed consent, participants completed the aforementioned survey measures using Qualtrics, an online survey software.

Data analyses

Preliminary analyses examined the presence of missing data, extreme values and normality. For group comparisons, the Shapiro-Wilk\'e normality test reveals significant results. However, using QQ plots, the data distribution is generally symmetrical or approximately symmetrical. Given the large sample sizes, t-tests and F-tests are robust against normality violations in these cases. Also, kurtosis results show a platykurtic distribution indicating stability. Regarding the Perceived Effectiveness of Teaching Practices for Students with ADHD in Higher Education questionnaire, item number 10 'Give students a logbook to complete' has been removed due to the large amount of missing data (34.4%). Consequently, the follow-up analyses were performed with 49 items. We have chosen to impute the missing data with the mode by taking into account the participants that had the same profile according to gender, inattentive and hyperactive symptoms and total ADHD symptoms of the ASRS-v1.1. We also conducted chi-squared (categorical variables) and *t*-tests (continuous variables) on the sociodemographic characteristics of the sample to see if there were any differences between groups.

To establish a picture of the practices perceived as effective by students with ADHD and without ADHD (i.e. RQ 1), independent samples *t*-tests were conducted on the mean scores of the 15 most effective practices. IBM SPSS Statistics software version 27 was used.

Two-mode partitioning was used to understand the probability with which students perceive inclusive teaching practices to be effective as a function of ADHD symptoms (i.e. RQ 2). We used the MATLAB graphical user interface software (TwoMP) for two-mode partitioning models (Schepers and Hofmans 2009). This analysis, performed on the ADHD group only, provides a core matrix which reflects the strength of the relationship between each cluster of inclusive practices and

each cluster of ADHD symptoms. To obtain these clusters, first, conditional probabilities were computed to obtain the perceived effectiveness of each inclusive teaching practice (effective/not effective) in the case of the presence of a particular ADHD symptom (presence/absence). This results in a 49 (inclusive teaching practices) by 18 (ADHD symptoms) data matrix of probabilities. Second, we conducted a two-mode cluster analysis on this data matrix, which induces P practice clusters and Q symptom clusters from the data and obtains the entries of the PxQ core matrix by computing the entry for the combination of the pth practice cluster and the qth symptom cluster as the average conditional probability for the members of those clusters. This means that, if the core value is .50, then students with a cluster of ADHD symptoms have a 50% chance of perceiving this specific cluster of inclusive teaching practices as effective. Since the number of clusters in the solution had not previously been predetermined for the current study, we looked at different possibilities, varying P and Q from one to eight, and selected one based on interpretability on the one hand and goodness-of-fit vs. complexity balance on the other hand (i.e. using the CHull procedure; Schepers, Ceulemans, and Van Mechelen 2008). Matlab output can be found in Supplementary material 1.

Next, with IBM SPSS Statistics software version 27, we calculated participants' mean scores for each cluster of inclusive teaching practices (determined in the previous analysis) by averaging the scores on items that belong to the respective clusters. To investigate socio-demographic differences (i.e. research question 3), a series of analyses of variance (ANOVAs) were performed on the mean scores for the inclusive teaching practices clusters for students with ADHD, with respective gender (male/female), age, school level (university/university college) and comorbidity status (ADHD with and without comorbidity) as univariate independent variables. Lastly, ANOVA has been performed on the total sample ($n = 850$), to compare students with ADHD and students with other hidden disabilities.

Results

Research question 1: perceived effectiveness of inclusive teaching practices

Table 2 reveals the mean scores of students with and without ADHD on the 15 most effective items. The full list is available in Supplementary Material A. Independent samples *t*-tests indicated that the perceived effectiveness of these inclusive teaching practices did significantly differ for the students with ADHD and without ADHD for the following practices: records the course and makes it available to students; is passionate; demonstrates a positive attitude; uses humour; is interested in students in their class. In these cases, the ADHD group rates these inclusive teaching practices significantly more effective than the group without ADHD. All averages are above 2 and the ADHD group rates 10 inclusive teaching practices significantly more effective than those without ADHD. Small effect sizes (Cohen 1988) indicate that the differences between groups are rather minimal.

Table 2. Means and standard deviation of top 15 most effective inclusive teaching practices, compared for students with ADHD and students with a functional disability other than ADHD.

Items The instructor . . .	Students with ADHD ($n = 355$)		Students with other functional disability ($n = 495$)		p
	M	SD	M	SD	
Records the course and make it available to students.	3.62	.75	3.51	.77	**.034**
Is passionate.	3.62	.63	3.51	.65	**.021**
Keeps breaks during class.	3.60	.67	3.55	.70	.285
Formulates exam questions in clear terms.	3.59	.71	3.52	.71	.152
Targets important material for the exam.	3.57	.66	3.56	.63	.705
Is comprehensive.	3.56	.66	3.48	.66	.079
Is available and accessible.	3.54	.69	3.51	.65	.486
Makes sure that exam material is included in the course notes.	3.54	.71	3.47	.71	.129
Demonstrates a positive attitude.	3.54	.64	3.44	.63	**.021**
Organizes the course content so that it is structured, clear and intuitive.	3.53	.72	3.47	.68	.233
Provides clear instructions for the assignments.	3.49	.76	3.40	.76	.094
Treats students with disabilities like any other student.	3.45	.84	3.45	.76	.968
Provides numerous examples to facilitate understanding (e.g. use of vignettes, refer to current events, tell anecdotes or personal experiences, use metaphors, etc.)	3.41	.76	3.35	.73	.316
Uses humour.	3.40	.76	3.17	.80	**<.001**
Is interested in students in their class.	3.39	.80	3.28	.74	**.039**

Research question 2: perceived effectiveness of inclusive teaching practices for particular ADHD symptoms

The model obtained by the two-mode partitioning yields a four inclusive teaching practice clusters by one symptom cluster solution. This model accounted for 88.10% of the variance in how often inclusive teaching practices are perceived as effective by post-secondary students with ADHD (leaving the group without ADHD out of this analysis). Table 3 defines the commonalities of the inclusive teaching practices that were grouped in each of the four clusters. Supplementary Material A depicts to which cluster each specific inclusive teaching practice items belongs according to the two-mode partitioning.

The ADHD symptoms remain grouped into one cluster, indicating that regardless of the specific profile of ADHD symptoms of a post-secondary student with ADHD, there is no difference in the inclusive teaching practice clusters probability of perceived effectiveness. The chances that these practices are perceived as effective are high for flexible

Table 3. Clusters of inclusive teaching practices.

Clusters	Practices	Description
1	Flexible	The instructors provide flexible instructional support to process information and expression.
2	Emotional supportive	The instructors provide emotional support to students by establishing (a) a secure base to explore their learning process and (b) a safe haven to reduce uncertainty and stress levels through clear and structured instructions.
3	Engaging	The instructors provide multiple means of engagement that promote/encourages motivation and participative classroom organisation (e.g. clear structure, rules) during class.
4	Representation	The instructors provide instructional and organisational support to flexibly present and optimally process information during class.

practices (probability = .70), emotional supportive practices (probability = .89), and representation practices (probability = .80). For engaging practices, the probability is only .53.

Research question 3: influence of sociodemographic variables

Within the ADHD group, ANOVAs revealed that there were statistically significant differences by school level for two of the four inclusive teaching practice clusters (determined in the previous analysis). First, flexible practices $F(1, 353)$, 4.893, $p = 0.026$, $\eta^2 = 0.014$ are significantly more effective for university college students ($M = 2.95$, SD = .51) than for university students ($M = 2.83$, SD = .50) with ADHD. Second, engaging practices $F(1, 353)$, 5.991, $p = 0.015$, $\eta^2 = 0.015$ are also perceived as more helpful for university college students ($M = 2.63$, SD = .63) than for university students ($M = 2.47$, SD = .56). Results indicated small effect sizes between groups.

Results with gender only showed a significant effect with representation practices: $F(1, 347)$, 6.756, $p = 0.010$, $\eta^2 = 0.019$. Female students with ADHD ($M = 3.23$, SD = .43) scored representation practices significantly higher than male students with ADHD ($M = 3.11$, SD = .42). In addition, the ANOVAs for age (17–20 years old, 21–24 years old, 25 years old and more) showed no significant differences (all F-values ≤2.633, all p-values ≥0.073). Similarly, no significant differences on the four clusters were found between students with ADHD with and without comorbidities (all F-values ≤2.174, all p-values ≥0.141).

Finally, for the full sample, the ANOVAs comparing students with and without ADHD indicated a significant effect on emotional supportive practices ($F(1,848)$, 4.282, $p = 0.039$, $\eta^2 = 0.005$). According to the means, emotional supportive practices are significantly more effective for students in the ADHD group ($M = 3.48$, SD = .42) compared to those without ADHD ($M = 3.42$, SD = .39).

Discussion

This study aims to determine whether inclusive teaching practices are perceived to be effective in elevating the special educational needs of post-secondary students with ADHD. The **first objective** of this study was to explore which inclusive teaching practices are perceived as effective for post-secondary students with ADHD. The findings indicate how teachers in post-secondary education can support these students during their academic studies. All 49 inclusive teaching strategies are perceived to be effective for students with and without ADHD. For 10 out of 49 practices, students with ADHD benefit significantly more than students without ADHD. Within the 15 most effective inclusive teaching practices, students with ADHD value instructor attributes like passion, positivity, interest in students, and humour more than students without ADHD. A caring, enthusiastic, and accessible instructor stimulates students to learn. This is consistent with previous educational research: according to Tinto (2012), the most influential factor on students' academic and social integration and motivation is their relationship with their teacher during class. Thus, the approach of the instructor is crucial to the transmission of knowledge. Additionally, the positive emotions generated by a positive teacher–student relationship contribute to learning and retention (Espinosa 2020). Therefore, it is essential that educators, especially at the post-secondary level, can elicit these feelings from their students.

The **second objective** was to explore whether sets of inclusive teaching practices would be more effective for specific profiles of ADHD symptoms. The findings revealed that the perceived effectiveness of inclusive teaching practices to elevate special educational needs is independent of specific ADHD symptomatology, hinting at a truly inclusive nature of these strategies as also stressed by Emmers et al. (2017) and Barkley (2014). This finding is a first very hopeful result in the 'inclusive' direction given the large heterogeneity of ADHD symptomatology and its associated special educational needs (Lovett, Nelson, and Lindstrom 2015). Given the fact that the organisation of reasonable accommodations is effortful and at times stigma-provoking, this is particularly promising since these inclusive teaching practices are often easy to implement (Cumming and Rose 2021).

The two-mode partitioning did, however, differentiate between four clusters of inclusive teaching practices. Among these, emotional supportive practices (cluster 2) have the highest probability of being perceived as effective by post-secondary students with ADHD. These strategies align with the emotional support dimension of the Teaching Trough Interactions (TTI) framework by Hamre and Pianta (2007), which is a prominent educational theory originally designed for younger students in traditional classrooms. This dimension highlights the positive impact of teachers' emotional support strategies on both social-emotional functioning and academic performance as also found by Skinner & Belmont in (1993) and Hamre and Pianta in 2005. It operates based on attachment principles, with the teacher acting as both a secure base for students to explore learning, and a safe haven for them during times of distress. In our study, items in the emotional supportive cluster reflect these roles, emphasising the lecturer's role as a secure base (e.g. 'treats students with disabilities like any other student') and a safe haven (e.g. 'is available and accessible'). Clear and structured instructions, as well as external emotional support and regulation within this cluster help reduce uncertainty and stress levels. Research by Lipka, Baruch, and Meer (2019) also underscores the importance of emotional support, such as feeling cared for and tolerated by the instructor, for students with ADHD and other learning disabilities.

The clusters flexible and representation practices have a chance of, respectively, .70 and .80 to be perceived as effective by post-secondary students with ADHD. Strategies in both clusters show overlap with TTI framework's instructional and organisational support (Hamre and Pianta 2007). Based on the TTI framework, instructional support builds on scaffolding principles where the instructor models practices and provides students with the language to structure thought. This resonates in strategies such as 'provides learning strategies to students' and 'uses the problem-solving approach to integrate theory with practice' in this study's clusters, allowing students to reach higher levels of cognitive functioning of which they were previously not capable. Organizational support becomes evident in practices such as 'repeats instructions for an exercise or assignment more than once' or 'provides detailed planning of the session' which allows the student to use all available resources for learning purposes, not to be cognitively overloaded by external (e.g. background noise) or internal (e.g. worries) distractors. The flexible nature ('is flexible with assignment deadlines') and focus on resourceful and knowledgeable representation of study material ('presents information in multiple formats') of the flexible and representation practices tap into key principles of the UDL framework (CAST 2018). Many of these practices and principles support students with ADHD in their deficits in executive

function and attention. Therefore, guiding students through the completion of assignments can increase their success and persistence with the assigned task.

The cluster with the lowest probability of perceived effectiveness to elevate special educational needs for post-secondary students with ADHD consists of engaging practices. Taking into account the altered motivational style in some individuals with ADHD, the low effectiveness may come as a surprise. On the one hand, this could reveal that the currently selected strategies are simply not specifically targeting the underlying mechanism of the altered motivational style (e.g. differences in delay aversion) (Morsink et al. 2022). On the other hand, it is important to consider that motivation perhaps does not have to be increased in this particular group of participants as (a) motivational differences are not characteristic for all individuals with ADHD (Sonuga-Barke, Bitsakou, and Thompson 2010), and (b) we are focusing here on a very specific group of students that, despite a series of special educational needs, has put in continuous effort throughout their school trajectory to make it to post-secondary education (Emmers et al. 2017).

The **third objective** of the current study was to determine the influence of certain variables on the perceived effectiveness of inclusive teaching practices. Findings showed that students with ADHD in university colleges place a greater emphasis on strategies that keep them engaged in class, help them process information and perform well on assignments and exams. Hypothetically, the larger variation in teaching and evaluation methods in university colleges (compared to the more classical approaches at university) might imply that these students have more experience with and more appreciation for this more flexible approach of teaching, reflected in the significantly higher effectiveness scores.

No differences in effectiveness were found among the four inclusive practice clusters based on age. This result is quite interesting, as it indicates that the diverse group of younger students rates the practices as effectively as the more selective group of older students, who have likely already successfully advanced to higher grades in post-secondary education. This again points to the universal nature of these strategies. Quite surprisingly, one gender effect was found: representation practices were rated by female students significantly higher than by male students. No clear explanation is available for this finding.

Furthermore, emotional supportive practices are more important or helpful for students with ADHD compared to those with other clinical conditions. Emotional supportive practices can include, among other things, being a passionate instructor, being interested in his/her students, demonstrating a positive attitude, and treating students with disabilities like any other student. This is particularly beneficial for students with ADHD, who often face arousal and emotional regulation problems (Emmers et al. 2017). As the selected strategies in this study were determined solely based on interviews with students with ADHD in post-secondary education (Lagacé-Leblanc 2021), we might have missed strategies targeting special educational needs primarily associated with other clinical conditions that may or may not also be beneficial for the ADHD population. However, by not including these strategies, students without ADHD but other hidden disabilities might not feel fully accommodated by the current selection of strategies. Nevertheless, the absence of other significant differences between students with ADHD with and without comorbidities on the one hand and ADHD and other hidden disability on the other hand indicates that the majority of inclusive teaching practices are there for all students. It also means that comorbidities of ADHD are not affecting the effectiveness of

inclusive teaching practices differentially and that our findings are pointing at a fully universal approach.

Strengths and limitations of the study

This research is unique in three respects. First, it surveys a particularly large sample of 850 post-secondary students with disabilities, providing a diverse representation of this often unheard-of population, whereas other studies often work with much smaller samples or survey only one university or university college (e.g. Daffner et al. 2022; DuPaul et al. 2021). Second, when discussing teaching strategies, we made sure to include student perspectives. Something that is frequently mapped by efficacy questionnaires of instructors themselves, students are now given a voice, which is critical in the context of inclusive education and hence inclusive research. Third, we provide insight into inclusive teaching strategies that work precisely for the target group of students with ADHD, whereas in other studies there is often only a dichotomy between people with and without impairment.

Future research may benefit from comparing inclusive practices across educational contexts to determine their adaptability and relevance (e.g. university vs. university college education). Comparative research may help us comprehend ADHD teaching methods.

Certain limitations must be recognised. First, the study was conducted with participants from seven post-secondary education institutions in Flanders, Belgium. On the one hand, this indicates that there is a particularly large variation in the large sample ($n = 850$), which can be seen as a major plus of this study. On the other hand, the study only recruited in a particular geographical area with a very specific educational system, limiting the extrapolation of these results to other contexts or populations.

Second, the current survey makes use of self-report, making it susceptible to biases and inaccuracies. However, working with a professional team of educational specialists, utilising such a large sample size, and on top of that, validating the instruments that were used is all aspects that, in our opinion, are more than enough to adequately mitigate the effects of using self-reported measures as a risk. Future research should include multi-method techniques, such as quantitative self-report surveys and qualitative interviews, to better understand ADHD students' lives. Nevertheless, we can unequivocally state that in the future research based on this exploratory study, it is essential to include the voices of both teachers and students and to use multiple methods to look at various issues related to these teaching strategies, their application, and the effects that they have on the academic success of students.

Fourth, the participants were all post-secondary students registered with their institution's ODS, which may have affected the results and representativeness of the data. Students with ADHD or other hidden disabilities who choose not to register and, as such, do not utilise adaptive services may have unique pedagogical requirements. Nonetheless, this presents a formidable challenge as it raises the question of how one can identify students who actively seek to remain unidentified.

To capture the experiences of a broader population, future studies might explore the perspectives of unregistered students, thereby gaining insights into the inclusive practices that could benefit those who may not actively seek support.

Additionally, the study aimed to explore specific objectives related to inclusive teaching practices for students with ADHD. While the scope of these objectives may appear ambitious given the survey-based methodology and the use of a preliminary, unvalidated instrument, several considerations support the chosen approach. The instrument was developed based on prior qualitative research, including in-depth interviews with students with ADHD, and the items were generated by ADHD experts. These items were further refined through feedback from members of the target population, in a process comparable to member checking.

The purpose of the study was not to produce generalisable or normative claims, but rather to offer a descriptive account of which teaching strategies – identified through earlier qualitative work – are recognised and endorsed by students with ADHD. As such, the instrument functions as a foundational, exploratory tool – an inventory – rather than a fully validated scale. Nevertheless, by analysing the frequency and consistency with which these strategies are endorsed, the study offers initial evidence that supports the relevance and potential utility of the items. Future research should build upon these findings to formally test the psychometric properties of the instrument and evaluate its applicability across diverse student populations and educational contexts.

Lastly, according to Jansen et al. (2019), the use of two-mode partitioning leads to a reduction in data and a loss of specificity. Notwithstanding, this statistical analysis was used to make the data more manageable and to provide a general understanding of the perceived effectiveness of each inclusive teaching practice for students with a specific ADHD symptom in post-secondary education. Based on prior professional experiences with ADHD, school psychology, and post-secondary education, the researchers took care to ensure that the definitions of each cluster were representative of all the items.

Conclusion

When it comes to inclusive post-secondary education, the academic literature has presented a dichotomy between policies that target specific groups and policies that are more inclusive of all students. This study specifically and clearly shows that there are gains to be made in inclusive learning environments for all students by looking specifically at the needs of the target group of students with ADHD. As a result, we may make the case that 'one size does fit all'. To our knowledge, this is a first study in the field of research on inclusive post-secondary education, and it lends credence to the notion that learning environments ought to be created with greater force, rather than the student being required to adapt to the learning environment itself and being provided with reasonable accommodations for it. Therefore, it would appear that quality education and inclusive education are similar terms.

This is an essential finding that should be shared not only with the teachers themselves but also with policy-makers, who are frequently in charge of educational policy for students 'with disabilities'. Given that this study found that students with and without ADHD share the same factors in teaching strategies that are important and perceived as effective, rather than implementing integration policies, it is necessary to re-evaluate educational policies, let go of target group policies, and adapt learning environments in post-secondary education.

By designing supportive courses that foster student engagement and success (Dowrick, Anderson, and Acosta 2005), faculty members can play a pivotal role in ensuring access to education for students with and without ADHD. Indeed, targeted efforts to increase faculty knowledge of disability and methods for ensuring their classes are accessible and inclusive, may enable instructors to better serve this population. Our research suggests a variety of instructional strategies for achieving this objective. In fact, the research identifies several significant and effective teaching practices for all ADHD symptoms. In addition, the results highlight the critical and leading role instructors play in the pedagogical decisions they make and the interactions they have with students. Even though they are significant to students, teaching practices are seldom discussed. Educators must be aware of the specific instructional strategies that individuals with ADHD symptoms find effective. Teachers can incorporate these approaches into their teaching strategies with the assistance of professional development programmes and training workshops.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This research was supported by the Fond de recherche du Québec – Society and Culture [FRQSC] under a Postdoctoral Fellowship [296726].

ORCID

Elke Emmers http://orcid.org/0000-0001-6419-7429

References

Advokat, C., S. M. Lane, and C. Luo. 2011. "College Students with and without ADHD: Comparison of Self-Report of Medication Usage, Study Habits, and Academic Achievement." *Journal of Attention Disorders* 15 (8): 656–666. https://doi.org/10.1177/1087054710371168.

Almeqdad, Q. I., A. M. Alodat, M. F. Alquraan, M. A. Mohaidat, and A. K. Al-Makhzoomy. 2023. "The Effectiveness of Universal Design for Learning: A Systematic Review of the Literature and Meta-Analysis." *Cogent Education* 10 (1): 1–24. https://doi.org/10.1080/2331186X.2023.2218191.

American Psychiatric Association. 2013. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Washington, DC.

Baeyens, D. 2021. "Effectiveness of Reasonable Accommodations in Students with ADHD: An Experimental and Intervention Study." *Pedagogische Studien* 98 (4): 268–284.

Baeyens, D., L. Van Dyck, C. Broothaerts, M. Danckaerts, and S. Kooij. 2012. *ZVAH: Zelfrapportagevragenlijst voor aandachtsproblemen en hyperactiviteit (16-25jaar)*. Leuven: Acco.

Barkley, R. A. ed. 2014. *Attention-Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment*, xiii. 4th ed. New York, NY: Guilford.

CAST (Center for Applied Special Technology). 2018. *Universal Design for Learning Guidelines Version 2.2*. National center on universal design for learning. http://udlguidelines.cast.org.

Cohen, J. 1988. *Statistical Power Analysis for the Behavioral Sciences*. Lawrence Erlbaum Associates, Inc.

Cumming, T. M., and M. C. Rose. 2021. "Exploring Universal Design for Learning as an Accessibility Tool in Higher Education: A Review of the Current Literature." *The Australian Educational Researcher* 49 (5): 1025–1043. https://doi.org/10.1007/s13384-021-00471-7.

Daffner, M. S., G. J. DuPaul, A. D. Anastopoulos, and L. L. Weyandt. 2022. "From Orientation to Graduation: Predictors of Academic Success for Freshmen with ADHD." *Journal of Postsecondary Education and Disability* 35 (2): 113–130.

Dowrick, P. W., J. Anderson, and J. Acosta. 2005. "Postsecondary Education Across the USA: Experiences of Adults with Disabilities." *Journal of Vocational Rehabilitation* 22 (1): 41–47.

DuPaul, G. J., M. J. Gormley, A. D. Anastopoulos, L. L. Weyandt, J. Labban, A. J. Sass, C. Z. Busch, M. K. Franklin, and K. B. Postler. 2021. "Academic Trajectories of College Students with and without ADHD: Predictors of Four-Year Outcomes." *Journal of Clinical Child and Adolescent Psychology* 50 (6): 828–843. https://doi.org/10.1080/15374416.2020.1867990.

DuPaul, G. J., L. L. Weyandt, S. M. O'Dell, and M. Varejao. 2009. "College Students with ADHD: Current Status and Future Directions." *Journal of Attention Disorders* 13 (3): 234–250. https://doi.org/10.1177/1087054709340650.

Emmers, E., D. Jansen, K. Petry, S. van der Oord, and D. Baeyens. 2017. "Functioning and Participation of Students with ADHD in Higher Education According to the ICF Framework." *Journal of Further and Higher Education* 41 (4): 435–447. https://doi.org/10.1080/0309877X.2015.1117600.

Espinosa, G. 2020. "La relation enseignant-élève et l'affectivité : place et importance chez le jeune adulte en contexte de formation." In *Soutien à la persévérance et à la réussite des jeunes et des adultes en formation professionnelle*, edited by É. Dans Mazalon and M. Dumont, 155–177. Québec: PUQ.

European Commission. 2010. "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: European Disability Strategy 2010-2020: A Renewed Commitment to a Barrier-Free Europe." https://www.cedefop.europa.eu/en/news/european-disability-strategy-2010-2020-renewed-commitment-barrier-free-europe .

Fleming, A., and R. McMahon. 2012. "Developmental Context and Treatment Principles for ADHD Among College Students." *Clinical Child & Family Psychology Review* 15 (4): 303–329. https://doi.org/10.1007/s10567-012-0121-z.

Gilbert, P. 2005. "Attention-Deficit/hyperactivity Disorder in Community College Students: A Seldom Considered Factor in Academic Success." *Journal of Social Work in Disability & Rehabilitation* 4 (1/2): 57–75.

Hamre, B. K., and R. C. Pianta. 2006. "Can Instructional and Emotional Support in the First-Grade Classroom Make a Difference for Children at Risk of School Failure?" *Child Development* 76 (5): 949–967. https://doi.org/10.1111/j.1467-8624.2005.00889.x.

Hamre, B. K., and R. C. Pianta. 2007. "Learning opportunities in preschool and early elementary classrooms." In *School readiness and the transition to kindergarten in the era of accountability*, edited by R. C. Pianta, M. Cox and K. L. Snow, 49–83. Baltimore, MD: Paul H. Brookes.

Jansen, D., K. Petry, E. Ceulemans, I. Noens, and D. Baeyens. 2017. "Functioning and Participation Problems of Students with ASD in Higher Education: Which Reasonable Accommodations are Effective?" *European Journal of Special Needs Education* 32 (1): 71–88. https://doi.org/10.1080/08856257.2016.1254962.

Jansen, D., K. Petry, E. Ceulemans, S. van der Oord, I. Noens, and D. Baeyens. 2017. "Functioning and Participation Problems of Students with ADHD in Higher Education: Which Reasonable Accommodations are Effective?" *European Journal of Special Needs Education* 32 (1): 35–53. https://doi.org/10.1080/08856257.2016.1254965.

Jansen, D., K. Petry, S. W. Evans, I. Noens, and D. Baeyens. 2019. "The Implementation of Extended Examination Duration for Students with ADHD in Higher Education." *Journal of Attention Disorders* 23 (14): 1746–1758. https://doi.org/10.1177/1087054718787879.

Kennedy, J., C. Missiuna, N. Pollock, S. Wu, J. Yost, and W. Campbell. 2018. "A Scoping Review to Explore How Universal Design for Learning is Described and Implemented by Rehabilitation

Health Professionals in School Settings." *Child Care Health Development* 44 (5): 670–688. https://doi.org/10.1111/cch.12576.

Kessler, R. C., L. Adler, M. Ames, O. Demler, S. Farone, E. Hiripi, M. J. Howes, et al. 2005. "The World Health Organization Adult ADHD Self-Report Scale (ASRS): A Short Screening Scale for Use in the General Population." *Psychological Medicine* 35 (2): 245–256. https://doi.org/10.1017/s0033291704002892.

Kooij, J. J. S., J. K. Buitelaar, E. J. van den Oord, J. W. Furer, C. A. T. Rijnders, and P. P. G. Hodiamont. 2005. "Internal and External Validity of Attention-Deficit Hyperactivity Disorder in a Population-Based Sample of Adults." *Psychological Medicine* 35 (6): 817–827. https://doi.org/10.1017/S003329170400337X.

Lagacé-Leblanc, J. 2021. "Mesures d'accommodements dans les établissements postsecondaires québécois: efficacité perçue et influence sur l'expérience scolaire selon les étudiants ayant un TDAH." Doctoral diss., Université du Québec à Trois-Rivières. https://depot-e.uqtr.ca/id/eprint/10089/1/eprint10089.pdf.

Lagacé-Leblanc, J., L. Massé, and N. Rousseau. 2022. "Academic Impairments Faced by College Students with Attention-Deficit Hyperactivity Disorder: A Qualitative Study." *Journal of Postsecondary Education and Disability* 35 (2): 131–144. https://www.slu.edu/life-at-slu/student-success-center/accessibility-and-disability-resources/pdfs/academic-impairments-faced-by-college-students-with-adhd.pdf .

Lipka, O., A. F. Baruch, and Y. Meer. 2019. "Academic Support Model for Post-Secondary School Students with Learning Disabilities: Student and Instructor Perceptions." *International Journal of Inclusive Education* 23 (2): 142–157. https://doi.org/10.1080/13603116.2018.1427151.

Lovett, B. J., J. M. Nelson, and W. Lindstrom. 2015. "Documenting Hidden Disabilities in Higher Education: Analysis of Recent Guidance from the Association on Higher Education and Disability (AHEAD)." *Journal of Disability Policy Studies* 26 (1): 44–53. https://doi.org/10.1177/1044207314533383.

Meyer, A., D. Rose, and D. Gordon. 2014. *Universal Design of Learning: Theory and Practice*. Wakefield, MA: CAST Professional Publishing.

Miller, L. A., L. J. Lewandowski, and K. M. Antshel. 2015. "Effects of Extended Time for College Students with and without ADHD." *Journal of Attention Disorders* 19 (8): 678–686. https://doi.org/10.1177/1087054713483308.

Morsink, S., S. Van der Oord, I. Antrop, M. Danckaerts, and A. Scheres. 2022. "Studying Motivation in ADHD: The Role of Internal Motives and the Relevance of Self Determination Theory." *Journal of Attention Disorders* 26 (8): 1139–1158. https://doi.org/10.1177/10870547211050948.

Peng, C.-Y. J., M. Harwell, S.-M. Liou, and L. H. Ehman. 2006. "Advances in missing data methods and implications for educational research." In *Real data analysis*, edited by S. Sawilowsky, 31–78. Greenwich, CT: Information Age.

Pinho, T. D., P. H. Manz, G. J. DuPaul, A. D. Anastopoulos, and L. L. Weyandt. 2019. "Predictors and Moderators of Quality of Life Among College Students with ADHD." *Journal of Attention Disorders* 23 (14): 1736–1745. https://doi.org/10.1177/1087054717734645.

Roberts, K. D., M. Satlykgylyjova, and H.-J. Park. 2015. "Universal design of instruction in postsecondary education: A literature review of empirically based articles." In *Universal design in higher education: From principles to practice*, edited by S. Burgstahler, 65–80. Harvard Education Press.

Schepers, J., E. Ceulemans, and I. Van Mechelen. 2008. "Selecting Among Multi-Mode Partitioning Models of Different Complexities: A Comparison of Four Model Selection Criteria." *Journal of Classification* 25 (1): 67–85. https://doi.org/10.1007/s00357-008-9005-9.

Schepers, J., and J. Hofmans. 2009. "TwoMP: A MATLAB Graphical User Interface for Two-Mode Partitioning." *Behavior Research Methods* 41 (2): 507–514. https://doi.org/10.3758/BRM.41.2.507.

Sedgwick-Müller, J. A., U. Müller-Sedgwick, M. Adamou, M. Catani, R. Champ, G. Gudjónsson, D. Hank, M. Pitts, S. Young, and P. Asherson. 2022. "University Students with Attention Deficit Hyperactivity Disorder (ADHD): A Consensus Statement from the UK Adult ADHD Network (UKAAN)." *BMC Psychiatry* 22 (1): 292. https://doi.org/10.1186/s12888-022-03898-z.

Seok, S., B. DaCosta, and R. Hodges. 2018. "A Systematic Review of Empirically Based Universal Design for Learning: Implementation and Effectiveness of Universal Design in Education for

Students with and without Disabilities at the Postsecondary Level." *Open Journal of Social Sciences* 6 (5): 171–189. https://doi.org/10.4236/jss.2018.65014.

Skinner, E. A., and M. J. Belmont. 1993. "Motivation in the Classroom: Reciprocal Effects of Teacher Behavior and Student Engagement Across the School Year." *Journal of Educational Psychology* 85 (4): 571. https://doi.org/10.1037/0022-0663.85.4.571.

Sonuga-Barke, E., P. Bitsakou, and M. Thompson. 2010. "Beyond the Dual Pathway Model: Evidence for the Dissociation of Timing, Inhibitory, and Delay-Related Impairments in Attention-Deficit/hyperactivity Disorder." *Journal of the American Academy of Child and Adolescent Psychiatry* 49 (4): 345–355. https://doi.org/10.1016/j.jaac.2009.12.018.

Tinto, V. 2012. *Completing College: Rethinking Institutional Action*. Chicago: University of Chicago Press.

United Nations. 2006. "Convention on the Rights of Persons with Disabilities." *Dutch Version*. December 13. http://www.ond.vlaanderen.be/leerzorg/VN/verdrag.pdf.

Weyandt, L. L., and G. J. DuPaul. 2013. *College Students with ADHD: Current Issues and Future Directions*. New York, NY: Spring.