

Disparities in the prevalence of ADHD diagnoses, suspicion, and medication use between Flanders and Québec from the lens of the medicalization process

Health

1–22

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DOI: 10.1177/13634593221093492

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Abstract

The prevalence of Attention-Deficit/Hyperactivity Disorder (ADHD) diagnoses and medication use has increased over time around the world, but significant regional differences remain. This paper aims to determine and explain disparities in ADHD prevalence and medication use among school-aged children in two distinct school systems, in Flanders (Belgium) and Québec (Canada). We present detailed descriptive and comparative analyses of data from 35 schools, 114 teachers, and 1046 parents (children) that were collected as part of a comparative international project. The data concern teacher and parent suspicions, teachers' ratings of ADHD-related behaviors in children, teachers' views of medication use, and teachers' beliefs about ADHD. The results show that, compared with Flanders, Québec had significantly more children diagnosed with ADHD and more frequent suspicions of ADHD in children by teachers

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and parents. We refer to the conceptual, institutional, and interactional levels of medicalization to interpret our findings and conclude that social and cultural readings of children's behaviors differ greatly between regions. Medicalization of children's behaviors is more common in Québec than in Flanders.

Keywords

ADHD diagnosis, comparative analysis, medicalization, medication, suspicion

Introduction

Previously considered a North American phenomenon, Attention-Deficit/Hyperactivity Disorder (ADHD), a psychiatric diagnosis characterized by developmentally inappropriate levels of hyperactivity, impulsivity, and/or inattention (American Psychiatric Association, 2013), is now rising in European, African, and Asian countries (Berger et al., 2018). With a worldwide prevalence of 6%–7% for children, ADHD is one of the most diagnosed conditions, peaking among 6–12 years old (11.4%) and 3–5 years old (10.5%; Willcutt, 2012). ADHD medication use among school-aged children has also increased over time around the world (Bachmann et al., 2017), to become the most used medication worldwide for behavioral problems in youth (Hinshaw and Scheffler, 2018).

Nevertheless, social sciences research has shown significant regional disparities in the prevalence of ADHD diagnoses and medication use (Akmatov et al., 2018; Bachmann et al., 2017; Fulton et al., 2015). Social, educational, and cultural factors at multiple contextual levels between and within countries perpetuate those disparities (Berger et al., 2018). Previous comparative empirical studies searching to explain differences in ADHD prevalence and medication use between North America and Europe are limited (see, e.g. Couture et al., 2003; Malacrida, 2004). They have focused mainly on teachers and health professionals, and on particular aspects of the phenomenon, like teachers' beliefs about ADHD and educators' role in the medicalization process. Our study overcomes these limitations by adding information from parents, and by widening the prevalence comparison to various stages of the ADHD medicalization process, such as teacher and parent suspicion, teacher ratings of ADHD-related behaviors in children, teachers' views of medication use, teachers' beliefs about ADHD, and diagnosis and medication use. In the discussion section, we consider the specific study contexts of Flanders and Québec and we refer to the conceptual, institutional, and interactional levels of medicalization (Conrad, 1992) to interpret our findings.

Theoretical background

Theoretical perspectives on ADHD

The most discussed ADHD conceptualizations are grouped under the neurobiological perspectives, where ADHD is considered to be a chronic medical condition characterized by a neurodevelopmental disorder (Faraone et al., 2021). Critics of these perspectives have argued that these views of ADHD are plagued by the reification problem (Hyman, 2010): Although no innate brain dysfunction can be detected (Faraone et al., 2021; Te

Meerman et al., 2017), a particular kind of behavior, in this case characterized by hyperactivity, impulsivity and/or inattention, is explained by a supposed concrete neurobiological defect. Furthermore, critics state that social factors should be considered when studying the ADHD phenomenon (Conrad, 2006; Te Meerman et al., 2017). Social inequalities based on socioeconomic, gender, age, and ethnic characteristics, and the extensive regional variability in the prevalence of ADHD diagnoses and medication use are clear signs of the presence of social influences (Akmatov et al., 2018; Bachmann et al., 2017; Brault and Lacourse, 2012; Fulton et al., 2015).

From a sociological perspective, ADHD is one of the best examples of the medicalization of deviant behaviors, immaturity, and of school difficulties (Brault et al., 2021; Conrad, 2006). Medicalization is a collective definitional process, in which non-medical problems are transformed into medical problems in a series of actions where a variety of actors working both inside and outside the medical field (school, family, media, etc.) participate (Conrad, 2007). Starting long before and continuing long after entering the doctor's office, the assignment of a psychiatric diagnosis is only one step in this complex process, which involves, for example, the tracking and identification of what poses the problem, a description and an understanding of the problem by the means of medicine, an informal medical labeling by the entourage (e.g. parent, teacher, coach, etc.), official labeling by the medical authorities and, finally, a medical treatment (Conrad, 2007).

The extent to which a phenomenon is minimally to fully medicalized can be estimated through different levels of medicalization (Conrad, 1992). The conceptual or macro level reflects the analytical way through which a society uses a medical lens to classify and understand problems. The institutional level relates to organizations using a medical framework to address non-medical problems. This stage comprises an ideological component, where the medical model is associated with a set of values, meanings, and attitudes. Finally, the interactional level refers to the micro level, where health professionals' daily practices name, explain, or treat a problem using their medical knowledge (Christiaens and van Teijlingen, 2009; Conrad, 1992). In sum, medicalization during childhood, like the ADHD phenomenon, reflects prevailing social and institutional norms that are operative on all levels of society (Conrad, 2007).

School setting, social context, and ADHD labeling

The school specifically is an important setting for identifying ADHD in students, since it values certain kinds of behaviors (sit still, quiet behaviors, etc.). Schools' non-medical staff are increasingly involved in identifying behavioral, emotional, and learning disorders, especially in the case of ADHD (Conrad, 2006; Singh, 2006). Teachers, in particular, have the opportunity to constantly compare a student's behaviors to those of other students. This unique observational position allows them to play an informal role as "disorder spotters" in the case of ADHD (Degroote et al., 2021; Phillips, 2006). In practice, this means that teachers are often the first to report ADHD-related behaviors to parents (Sax and Kautz, 2003). Furthermore, teachers also serve as information sources for parents looking for advice on ADHD treatments (Phillips, 2006).

However, research has revealed regional variability in teachers' beliefs, their inclination to suspect ADHD in children, or to refer them for medical assessment. Malacrida's

(2004) research showed that, contrary to British teachers, Canadian teachers were quick to label children with ADHD and press for medical treatment. She proposed that Canadian teachers had few alternative forms of social control available to them and were therefore more willing to suggest a diagnosis and medical treatment to parents. Another study, by Couture et al. (2003), aimed at comparing British and Québec teachers on their training, experience, and beliefs about ADHD. They demonstrated that Québec teachers had received more training about ADHD and had more experience in teaching students with ADHD or in being involved in the assessment of ADHD than their British counterparts. Contrary to their hypothesis, they also found that beliefs about ADHD having a biological cause were the number one belief category about ADHD in both regions, and British teachers even had a significantly higher mean score.

Teachers and their schools are likely bound by the national or regional educational agenda, health care systems, public policies, and so on. Einarsdottir (2008) described how schools in Iceland receive extra funds for children with special educational needs, which might increase the pressure to diagnose more children. This finding was confirmed in the United States, where the new public management, which values the use of objective and quantitative indicators of performance and efficiency, has reached educational institutions (Maroy and Pons, 2019). This has led to the creation of “school accountability laws,” where schools have, for example, to target specific graduation rates or mean test scores. However, one consequence was an increase in ADHD diagnoses and ADHD medication use in general, but specifically for low-income children, since they are the children who are thought to lag behind academically (Bokhari and Schneider, 2011; Fulton et al., 2015).

Finally, regional and national health care systems determine access to health care and mediate the definitions and choice of ADHD treatments (Conrad et al., 2018). According to Akmatov et al. (2018), a higher regional density of psychiatrists and pediatricians and thus better access to health care possibly leads to overdiagnoses. However, Schwandt and Wuppermann (2016) contradicted their findings, concluding that a larger supply of physicians leads to fewer misdiagnoses. Apart from access to health care, Malacrida (2004) described how the British psychiatric sector follows a more psychoanalytical tradition, where children’s problems will be perceived as emotional. In line with this view, family therapy will be recommended. Conversely, the developmental and behavioral psychology prevailing in Canada contributes to encouraging children to undergo behavioral testing with the aim of categorization and consequently leads to more diagnosis than in Britain.

Context

As Bergey et al. (2018) suggested there is an urgent need to consider ADHD “in a multifaceted discussion that explores factors including the epidemiology, etiology, management, and meaning of ADHD in various contexts from a broad social science perspective” (p. 4). Our study aims to compare the prevalence of ADHD-related behaviors, suspicion, diagnoses, and medication use among school-aged children in two distinct regions, namely East-Flanders (Belgium) and Saguenay-Lac-Saint-Jean (SLSJ; Québec, Canada). East-Flanders is a Dutch speaking urban region of Flanders, whereas SLSJ is a wide rural

and semi-rural northern region in the French speaking province of Québec. First, we expect this regional comparison will put forth well-known disparities in the prevalence of ADHD diagnoses and medication between North America and Europe (Bachmann et al., 2017). In Québec, life-time prevalence of ADHD diagnosis in 2015–2016 was 11.3% for youth (Diallo et al., 2019). Compared to the percentages of ADHD diagnoses worldwide, Flanders scored relatively low, with a diagnosis prevalence of 2.19% in elementary school children (Geerts et al., 2012). Second, the comparison may provide additional evidence in supporting to the role of school accountability in increasing ADHD labeling among students. In Flanders, where teachers are granted extensive autonomy, there are no standardized tests or other centralized evaluation systems that would allow parents, policy makers, or school staff to compare students' cognitive skills between schools (Ysenbaert et al., 2020). In Québec, we observed the opposite: A centralized educational system, standardized tests during elementary education, and resource allocation based on diagnostics (Maroy and Pons, 2019). Third, both regions differ on their share of immigrants, and ethnicity is known to be a determinant of ADHD diagnosis and medication (Thompson et al., 2020). East-Flanders is characterized by a considerable ethnic diversity (Statistiek Vlaanderen, 2021), whereas SLSJ population is very homogeneous, like most Québec's regions outside of the great metropolitan area (Arora, 2019). This ethnic diversity or lack thereof, is reflected in the student composition of schools (Agirdag et al., 2013).

Methods

Data collection and sample

School principals, teachers, and parents consented to participate (approved by the University of Québec in Chicoutimi's institutional review board and the equivalent for Ghent University) and completed paper-pencil or web questionnaires in either French (Québec) or Dutch (Flanders).

Schools. In 2018, 18 public elementary schools in Flanders and 17 in Québec ($n=35$) participated in an international comparative study aiming to understand the role of schools and teachers in identifying ADHD-related behaviors in children and their labeling as ADHD. These schools were randomly selected based on a list of stratified characteristics, such as their socioeconomic composition, location, and size. To recruit them, we created three lists of schools, approached the schools from the first list, and when one declined, we consulted the second list, and then the third list after a second refusal. The student populations varied from 53 to 669 enrolled students per school ($M=230.8$; $SD=132.7$).

Teachers. All first to third grade teachers in charge of a class were invited to complete an online questionnaire. Although the Québec sample included K-6 students and teachers, the sample for this study consisted of the first to third grades, which are the ones mostly related to ADHD suspicion and diagnosis (ZitStil Kenniscentrum, 2015). The teachers were surveyed about their knowledge and beliefs about ADHD, general expectations of

students, self-efficacy level, and behavioral management practices. The survey also included a set of 10 questions concerning each student in their classroom, for whom we had received the parents' consent. Therefore, an important strength of our data was that they included the teachers' perceptions for each individual student. In total, 61 teachers from Flanders and 53 from Québec filled out the survey. The participation rate was respectively 70.11% and 73.61%. The teacher population varied from 6 to 47 per school ($M=18.4$; $SD=8.5$).

Parents/Students. Every first to third grade student in the school was asked to take home a letter explaining the study, the consent form, and a short survey designed to assess the family's SES and the child's characteristics, such as ADHD diagnosis and medication use. Parents, mostly mothers (78% in Flanders and 88% in Québec), returned their questionnaire and their consent to their child's name being in the teacher's questionnaire. Data for 1569 students were collected. The response rate was 45.24% ($n=804$) in Flanders and 66.99% ($n=765$) in Québec. In this article, we will refer only to students ($n=1046$) for whom we collected parent and teacher information (534 Flemish and 512 Québec).

Variables

ADHD-related variables. Parents were asked whether a health professional had given their child an official ADHD diagnosis (*ADHD Dx*) and if the child was taking ADHD medication (*ADHD Rx*). We considered the parents' responses as a proxy for health professionals' practices and for the prevalence of ADHD diagnoses and medication use in the sample. Teachers were also questioned on these variables and they agreed with parents in 97% and 98% of cases on who had an ADHD diagnosis and took ADHD medication.

After indicating in a previous question that the child did not have an official ADHD diagnosis, both parents and teachers reported their *suspicion of ADHD* in the children using binary variables (0=no; 1=yes). Teachers were also asked which children, among those not already taking medication, they thought would benefit from ADHD medication (*Rx benefit*). When the teacher did report (a) an ADHD diagnosis or (b) medication intake in a student, but the parent did not, we considered that the teacher (a) suspected ADHD or (b) thought ADHD medication would benefit that child and these cases were then added to the count of the respective variables. These cases were then added to the number of the variables discussed.

Parents reported whether or not, since the child had begun elementary school, any teacher had ever told them that their child may have behaviors resembling ADHD symptoms. Their answers indicated teachers' *willingness* to share their suspicion of ADHD with the parents. Parents also reported if, outside of an ADHD diagnosis, their child had any *other condition affecting learning*, such as a chronic medical condition, a deficiency or a handicap.

Teachers were surveyed on their perception of the student's behaviors and capacities. They reported their perceptions of the child's *inattention*, *hyperactivity*, *efforts*, and *cognitive capacities* on a 5-point scale (1-very low; 5-very high). They rated their agreement

about the child being an *ideal student* on a 5-point Likert scale (1-totally disagree; 5-totally agree) and indicated whether they thought the student would pursue *postsecondary education* (0=no; 1=yes).

Teachers were asked about their beliefs regarding ADHD, using the 21 items of the Attention Deficit Hyperactivity Orientation Scale (ADHDOS; Couture et al., 2002). They reported their agreement level on a 4-point Likert scale (1-totally disagree; 4-totally agree) for each item and were grouped into five patterns of beliefs associated with explanations and treatments of the ADHD behaviors: (1) the *moral-ethical* category refers to beliefs that ADHD behaviors are intentional and indicate a moral defect for which punitive interventions are favored; (2) the *allopathic medical* category sees the behaviors as biologically driven, and biomedical explanations and treatments are preferred; (3) the *sociocultural* category is associated with the sociological perspective, and the behaviors are believed to originate from the sociocultural context, which interventions should target; (4) the *alternative medical* category explains ADHD behaviors by toxic environments, and alternative medicine is considered the best treatment; and (5) the *cognitive-style/political* category emphasizes that society's expectations undervalue individuals with certain profiles and that society should adapt to these individuals, not the reverse. The cognitive-style/political scale had five summed items, and the other ones had four. We computed a score for each teacher for all five categories of beliefs. We also identified each teacher's main category of belief, namely the scale on which they scored highest. McDonald's Omega (ω ; Hayes and Coutts, 2020) was used to assess the reliability of these scales (scores shown in Table 5).

Demographic, socioeconomic, and school-related variables. These demographic variables were essential to assess the similarities and differences between the Flemish and Québec samples. *Gender* and *ethnic group* were binary variables: Being a boy and being a female teacher were coded 1, as was belonging to the majority ethnic group (Belgian and West European; Canadian). The *age* variable was continuous for teachers and binary for students, as we emphasized the birth month compared to the school cutoff date to identify the youngest students in the classroom (*3 months younger*).

SES is a multidimensional concept. To decrease the risk of overestimating its effect, it is recommended to measure SES using multiple types of indicators (e.g. economic, cognitive, and cultural capital indicators; Sirin, 2005). Therefore, the *students' SES* was based on the mean score of three standardized parent-reported variables: Family wealth, parents' occupation, and parents' education level. Family wealth consisted of the sum of the family's material possessions measured through 5 items (cellphones, televisions, computers, cars, and bathrooms). Parents' occupational prestige level reflected the highest scoring occupation of both parents on the International Socio-Economic Index (ISEI), based on the International Classification of Occupations (ISCO; Ganzeboom and Treiman, 2010). Parents' education level was measured according to the highest education level attained by one of the parents, from high school to university. The students' SES variable was standardized and a higher score was associated with a higher family SES. *Teachers' SES* referred to their social origins and was based on their parents' occupational prestige level, also measured through the ISEI/ISCO classification.

Parents were asked (a) if they believed their child was *behind*, *on time*, or *ahead*, relative to the *normal curriculum* and (b) if they would describe their child's *academic achievement* as *lower*, *average*, or *higher* compared with their classmates. Their answers were transformed into three binary variables (0=no; 1=yes). Teachers reported their working status (full-time or not) and their number of years of experience as a teacher and within the school. Using a 6-point Likert scale (1-totally disagree; 6-totally agree), they also completed the nine items of the specific subscale (D5) for difficult behavior management of the teacher's self-efficacy scale regarding classroom management (Gaudreau et al., 2016).

School principals reported the size of their student and teacher populations. They estimated the percentages of students from low SES, of students without first language being French (Québec) or Dutch (Flanders), and of students born in another country. They also provided the number of male students and teachers, and of those who worked part-time. Finally, they gave the number of classrooms dedicated to students with SEN.

Analytical strategy

We conducted descriptive and comparative analyses. When data were nominal and binary, we opted for a two tailed Fisher's exact test of independence (FETI) which is recommended over chi-square test when the sample size is small (McDonald, 2014). When data were continuous, we performed a *t*-test. Statistical analyses were performed with IBM SPSS software, version 26 (IBM Corp., Released, 2019).

Results

Comparison between Flemish and Québec samples

As shown in Table 1, the Québec and Flemish student samples were statistically comparable on almost all characteristics. The proportions of boys and of youngest children in the classroom were similar. Students were mostly on time regarding the normal curriculum, and no significant differences in terms of SES were noted. The first difference found concerned the proportion of students from the majority ethnic group: The Québec sample reported almost entirely being Quebecers, whereas 18% of the Flemish sample reported belonging from non-western European ethnic groups. This result seemed to replicate the already known demographic characteristics of both regions (Arora, 2019; Statistiek Vlaanderen, 2021). The second and third difference laid in the proportion of students with lower and average academic achievement. Compared to Flanders, Québec had a higher proportion of students with lower grades (15.1% vs 5.6%; $p < .001$, FETI), which consequently diminished the proportion of students in the average group.

Québec and Flemish teacher samples differed significantly in age, years of experience, working status, and SES. As shown in Table 2, the Québec sample comprised older, evidently more experienced teachers. Québec teachers also came from lower SES backgrounds. However, both samples consisted primarily of women and teachers who had statistically similar self-efficacy levels when facing difficult behaviors. Table 3 shows that Québec and Flemish schools were similar in size and in proportions of boys, low-SES

Table 1. Students' sample (N= 1046): Comparison of the Québec and Flemish samples. Descriptive statistics and comparative tests.

	Complete sample		Québec sample		Flemish sample		Comparative test
	N valid	N (%)	N valid	N (%)	N valid	N (%)	
Boys	1041	503 (48.3)	511	257 (50.3)	530	246 (46.4)	FETI two tailed ($p=0.215$)
Majority ethnic group	1030	923 (89.6)	501	498 (97.6)	529	434 (82.0)	($p<0.001$)
3-months youngest	999	277 (27.7)	496	139 (28.0)	503	138 (27.4)	($p=0.888$)
Behind normal curriculum	1001	71 (7.1)	500	41 (8.2)	501	30 (6.0)	($p=0.178$)
On time normal curriculum	1001	906 (90.5)	500	445 (89.0)	501	461 (92.0)	($p=0.107$)
Ahead normal curriculum	1001	24 (2.4)	500	14 (2.8)	501	10 (2.0)	($p=0.418$)
Low academic achievement	982	102 (10.4)	496	75 (15.1)	486	27 (5.6)	($p<0.001$)
Average academic achievement	982	560 (57.0)	496	253 (51.0)	486	307 (63.2)	($p<0.001$)
Higher academic achievement	982	320 (32.6)	496	168 (33.9)	486	152 (31.3)	($p=0.414$)
	N valid	Mean (SD) [min/max]	N valid	Mean (SD) [min/max]	N valid	Mean (SD) [min/max]	Comparative test T-test
Students' SES (std)	1035	-0.029 (0.70) [-2.5/1.6]	510	-0.05 (0.72) [-2.5/1.6]	525	0.00 (0.68) [-2.2/1.4]	($t(1033)=-0.967$; ($p=0.334$))

Table 2. Teachers' sample (N = 114): Comparison of the Québec and Flemish samples. Descriptive statistics and comparative tests.

	Complete sample			Québec sample			Flemish sample			Comparative test
	N valid	Mean (SD)	N (%)	N valid	Mean (SD)	N (%)	N valid	Mean (SD)	N (%)	
Women	114	-	107 (93.9)	53	-	48 (90.6)	61	-	59 (96.7)	($p = 0.248$)
Majority ethnic group	114	-	111 (97.4)	53	-	53 (100)	61	-	58 (95.1)	($p = 0.247$)
Teachers' SES	106	54.7 (22.7)	-	53	48.5 (21.5)	-	53	60.8 (22.4)	-	($t(104) = -2.90; p = 0.004$)
Teachers' age	114	41.3 (11)	-	53	45.1 (10.2)	-	61	37.9 (10.7)	-	($t(112) = 3.66; p < 0.001$)
N year of experience as teacher	114	17.5 (10.8)	-	53	20.6 (9.7)	-	61	14.8 (11.1)	-	($t(112) = 2.94; p = 0.004$)
N year of experience in school	114	10.6 (9.8)	-	53	9.8 (10.0)	-	61	11.2 (9.6)	-	($t(112) = -0.74; p = 0.459$)
Full time > 90% hours	114	-	103 (90.4)	53	-	53 (100)	61	-	50 (82.0)	($p = 0.001$)
Personal efficacy scale—difficult behaviors management ($\omega = 0.87$)	112	4.82 (0.62)	-	52	4.85 (0.60)	-	60	4.79 (0.63)	-	($t(110) = 0.54; p = 0.591$)

Table 3. Schools' sample (N=35): Comparison of the Québec and Flemish samples. Descriptive statistics and comparative tests.

	Complete sample			Québec sample			Flemish sample			Comparative test
	N valid	Min/Max	Mean (SD)	N valid	Min/Max	Mean (SD)	N valid	Min/Max	Mean (SD)	
N teachers in school	34	6/47	18.4 (8.5)	17	6/34	17 (6.4)	17	6/47	19.9 (10.1)	$t(32) = -0.987; p = 0.331$
N male teachers	28	0/8	3.1 (2.2)	17	0/7	2.1 (1.7)	11	1/8	4.5 (2.1)	$t(26) = -3.40; p = 0.002$
N part-time teacher	32	1/16	4.65 (3.8)	17	1/12	3.2 (2.9)	15	2/16	6.2 (4.1)	$t(30) = -2.34; p = 0.026$
At least one SEN classroom (N, %)	33		12	17		5 (29.4)	16		7 (43.8)	$t(31) = 0.839; p = 0.408$
School size	35	53/669	230.8 (132.7)	17	53/401	196.8 (90.3)	18	85/669	262.9 (158.9)	$t(33) = -1.50; p = 0.143$
N boys	35	30/309	116.1 (64.0)	17	30/209	100.2 (46.5)	18	41/309	131.1 (75.3)	$t(33) = -1.45; p = 0.158$
Students (%) from low SES	35	0/100	35.9 (34.9)	16	0/100	39.7 (36.9)	14	0/99	31.5 (33.3)	$t(28) = 0.633; p = 0.532$
Students (%) without French or Dutch as first language	33	0/100	20.72 (30.3)	16	0/100	6.8 (24.8)	17	1/94	33.8 (15.5)	$t(31) = -2.809; p = 0.009$
Minority students (%)	32	0/50	6.8 (12.2)	16	0/3	0.68 (0.94)	16	0/50	12.1 (15.5)	$t(15.1) = -2.93; p = 0.10$

Table 4. ADHD-related variables: Descriptive statistics and comparative tests (Teachers; Parents).

	Complete sample			Québec sample			Flemish sample			Comparative test
	N valid	Mean (SD)	N (%)	N valid	Mean (SD)	N (%)	N valid	Mean (SD)	N (%)	
ADHD Dx (P)	1007 -		101 (10.0)	503 -		91 (18.1)	504 -		10 (2.0)	($p < 0.001$)
ADHD Rx (P)	994 -		89 (9.0)	500 -		85 (17.0)	494 -		4 (0.8)	($p < 0.001$)
Other condition affecting learning (P)	1001 -		33 (3.3)	500 -		13 (2.6)	501 -		20 (4.0)	($p < 0.001$)
Perceived efforts (T)	1046	3.74 (1.08)	-	512	3.71 (1.12)	-	534	3.76 (1.04)	-	($t(1044) = -0.624$; $p = 0.533$)
Perceived cognitive capacities (T)	1045	3.59 (1.10)	-	512	3.58 (1.15)	-	533	3.60 (1.06)	-	($t(1043) = -0.299$; $p = 0.765$)
Ideal student (T)	1046	4.17 (1.10)	-	512	4.21 (1.09)	-	534	4.14 (1.12)	-	($t(1044) = 0.947$; $p = 0.344$)
Postsecondary education (T)	1046 -		838 (80.1)	512 -		410 (80.1)	534 -		428 (80.1)	($p = 1.00$)
Perceived inattention (T)	1045	2.67 (1.14)	-	512	2.72 (1.18)	-	533	2.63 (1.09)	-	($t(1043) = 1.23$; $p = 0.220$)
Perceived hyperactivity (T)	1046	2.50 (1.20)	-	512	2.30 (1.22)	-	534	2.69 (1.15)	-	($t(1044) = -5.34$; $p < 0.001$)
Suspicion of ADHD (T) ^a	921 -		120 (13.0)	415 -		93 (22.4)	506 -		27 (5.3)	($p < 0.001$)
Rx benefit (T)	895 -		79 (8.8)	412 -		69 (16.7)	483 -		10 (2.1)	($p < 0.001$)
Teacher's willingness (P)	989 -		120 (12.1)	489 -		100 (20.4)	500 -		20 (4.0)	($p < 0.001$)
Suspicion of ADHD (P) ^a	891 -		71 (8.0)	405 -		53 (13.1)	486 -		18 (3.7)	($p < 0.001$)

^aThese variables are available only for students without an ADHD diagnosis.

Table 5. Teachers' ADHD beliefs: Descriptive statistics and comparative tests.

	Complete sample		Québec sample		Flemish sample		Comparative test
	N valid	Mean (SD)	N valid	Mean (SD)	N valid	Mean (SD)	
						T-test	
<i>ADHDOS—patterns of beliefs</i>							
Moral-ethical ($\omega = 0.69$)	113	6.7 (1.8)	52	6.29 (1.8)	61	7.02 (1.8)	($t(111) = -2.14; p = 0.035$)
Allopathic medical ($\omega = 0.626$)	113	10.0 (1.9)	52	10.9 (1.9)	61	9.18 (1.7)	($t(111) = 5.34; p < 0.001$)
Sociocultural ($\omega = 0.535$)	113	9.6 (1.9)	52	8.8 (1.7)	61	10.2 (1.9)	($t(111) = -4.03; p < 0.001$)
Alternative medical ($\omega = 0.608$)	113	8.7 (1.9)	52	8.1 (2.1)	61	9.3 (1.7)	($t(111) = -3.39; p < 0.001$)
Political/cognitive-style ($\omega = 0.634$)	113	11.6 (2.4)	52	10.2 (2.1)	61	12.7 (2.2)	($t(111) = -5.82; p < 0.001$)
<i>ADHDOS main category of belief</i>							
		N (%)		N (%)		N (%)	FETI two tailed
None most important	113	11 (9.6)	52	3 (5.7)	61	8 (13.1)	
Allopathic medical	113	43 (37.7)	52	33 (62.3)	61	10 (16.4)	($p < 0.001$)
Political/cognitive-style	113	25 (21.9)	52	5 (9.4)	61	20 (32.8)	($p = 0.003$)
Sociocultural	113	24 (21.1)	52	8 (15.1)	61	16 (26.2)	($p = 0.120$)
Alternative medical	113	10 (8.8)	52	3 (5.7)	61	7 (11.5)	($p = 0.234$)
Moral-ethical	113	0	0	0	0	0	Not applicable

students, and SEN classrooms. The Flemish schools had a significantly higher number of male and part-time teachers and higher percentages of minority students.

Comparison between Québec and Flanders on ADHD-related variables

Table 4 shows the results of the comparative analyses on ADHD-related variables. The first striking difference between Québec and Flanders was in the prevalence of ADHD diagnoses and medication use. Québec parents' reports indicated that 18.1% of the children had received an official ADHD diagnosis from a health professional and almost all of them were taking ADHD-specific medication (17%). In Flanders, the phenomenon was almost non-existent, with only 2% reporting diagnoses and less than 1%, medication use. However, compared to parents from Québec, Flemish ones reported significantly more that another condition affected their child's learning (4% vs 2.6%; $p < .001$, FETI).

The same pattern was observed for ADHD suspicion: Québec teachers suspected ADHD in significantly more students than Flemish teachers did (22.4% vs 5.6%; $p < .001$, FETI) and were more prone to think that medication would benefit the child (16.7% vs 2.1%; $p < .001$, FETI). According to the parents' reports, Québec teachers seemed more willing to tell parents about their ADHD suspicion (20.4% vs 4%; $p < .001$, FETI). Québec surpassed Flanders again when parents reported ADHD suspicion (13.1% vs 3.7%; $p < .001$, FETI). Interestingly, in both regions, teachers suspected more students than parents did.

These differences in ADHD-related variables between Québec and Flanders were not reproduced in teachers' perceptions of students' behaviors and capabilities. Our comparative analyses showed that there were no statistically significant differences in teachers' assessments of students' efforts, cognitive capacities, resemblance to the ideal pupil, or potential to access postsecondary education. Furthermore, teachers from both regions identified the same mean level of inattention in their students. Surprisingly, however, Flemish teachers found their students significantly more hyperactive (M 2.68; SD 1.2), compared to Québec teachers (M 2.30; SD 1.2; $t(1065) = 5.52$; $p < 0.001$).

Beliefs about ADHD differed significantly between regions (see Table 5). About 62.3% of Québec teachers had the allopathic medical explanation as their main belief, compared with 16.4% in the Flemish sample. In Flanders, the most common beliefs regarding ADHD pertained to the political/cognitive style (32.8%), followed by socio-cultural explanations (26.2%). Flemish teachers' beliefs seemed somewhat more heterogeneous than Québec teachers: The mean scores on all belief scales, except for the allopathic medical scale, were significantly higher for Flemish teachers.

Discussion

ADHD diagnoses and related medications have spread on every continent (Bergey et al., 2018), and their prevalence has exploded in recent decades (Bachmann et al., 2017; Brault and Lacourse, 2012). Although some researchers have argued against ADHD being a cultural construct (Willcutt, 2012), geographic disparities and social inequalities

in ADHD prevalence are opening the door to hypotheses in this direction (Akmatov et al., 2018; Malacrida, 2004; Sax and Kautz, 2003). We observed striking disparities between the regions studied: Compared to Flanders, Québec had nine times more ADHD diagnoses, 17 times more medication use, and approximately four times more suspicion from parents and teachers alike. Whereas these prevalence rates cannot be generalized to their respective populations because of the limits of the sample characteristics, they do reflect what previous epidemiological studies have shown in these regions (Diallo et al., 2019; Geerts et al., 2012) and concerning disparities between North America and Europe (Bachmann et al., 2017; Malacrida, 2004).

The comparability of the student samples on demographic and curriculum trajectory and the similarities in teachers' assessments of their students led us to conclude that the difference between Québec and Flanders in ADHD prevalence and medication use cannot be attributed to students' innate individual deficiencies, like brain dysfunction. Since teachers reported comparable levels of self-efficacy for managing difficult behaviors and believed they could handle children with difficult behaviors, regional differences could not be attributed either to differences in these teacher characteristics. We rather observe cultural, educational, and political factors underlying these regional disparities and for reasons we will explain below, we concluded that the medicalization process in Québec is further established than in Flanders on the conceptual, institutional, and interactional levels, as described by Conrad (1992). Consistent with the sociological perspective, our results point toward ADHD being a social phenomenon (Conrad, 2006).

Signs of medicalization at the conceptual level

One of the clearest signs of the regional differences in medicalization appears at the conceptual level, where the medical perspective is predominantly used to define a problem (Conrad, 1992). Despite the comparability of the Flemish and Québec teachers' reports of their students' characteristics (e.g. students' efforts, cognitive capacities, resemblance to the ideal pupil, potential to access postsecondary education, levels of inattention), Flemish teachers rated their students as hyperactive significantly more than Québec teachers did, but less often suspected ADHD. This surprising negative correlation between behavior assessment and ADHD suspicion reinforces the subjective, normative, and cultural aspects of the labeling process, in addition to the power of the medical conceptualization.

We can question Québec teachers' thresholds of tolerance toward childish behaviors, like hyperactivity (Timimi, 2002), however, we can also wonder if Québec teachers are indeed identifying ADHD in children based on hyperactivity and/or inattention. Because in the Québec sample, parents more often perceived their child's academic achievement as below average, we suggest that Québec teachers may actually be identifying children's poor academic results instead of hyperactivity and/or inattention. Previous research has revealed bidirectional influences between academic achievement and ADHD: ADHD symptoms negatively interfere with academic achievement; conversely, children with school difficulties are at greater risk of being labeled or diagnosed with ADHD (Metzger and Hamilton, 2021). In addition to teachers, Québec parents and health professionals follow these medicalization trends as well, which is

evidential in higher parental suspicion of ADHD and higher number of diagnoses and more medication use.

A parallel can be drawn with the main classification systems driving diagnostic criteria for ADHD in Europe and North America. Whereas Québec follows the criteria of the *Diagnostic and Statistical Manual of Psychiatric Disorders* (DSM; American Psychiatric Association, 2013), Europe has long followed guidelines of the World Health Organization's *International Classification of Mental and Behavioral Disorders* (ICD; World Health Organization, 1992). This system has proven more conservative and less inclusive than the DSM and is thus associated with a lower prevalence due to its more selective criteria (Conrad and Bergey, 2014; Malacrida, 2004). In addition, ICD refers to hyperkinetic disorder, while DSM refers to ADHD.

Signs of medicalization at the institutional level

Our results also demonstrate that medicalization in Québec has reached the institutional level, where organizations adopt a medical framework to address non-medical problems (Conrad, 1992). Teachers' beliefs about ADHD provide some of the most useful information for understanding the regional disparities in ADHD suspicion. When beliefs are shared between members of a group (herein of a region), it informs about the group's culture which "provides organization members with shared interpretations, so they know how they are expected to think and act" (Van Houtte, 2005: 79). Our results showed that Québec teachers scored significantly higher than Flemish teachers on the allopathic medical scale. Consequently, Québec teachers mostly understood ADHD from a bio-neurological perspective, as a condition with a somatic origin. These shared beliefs, already identified by Couture and colleagues in 2003, point toward a culture of medicalization in Québec, where the focus is on individual deficit, rather than on individual strengths or on the role of the social environment in producing certain behaviors (Conrad, 2007). Québec teachers might be less likely to embrace the responsibility and to change, for example, the classroom environment or their pedagogical practices. They might also be more prone to valorize a solution outside of the educational realm such as direct medical aid to the child. Accordingly, Québec teachers suspected more ADHD and more often talked to parents about their suspicion, thus contributing to the medicalization of ADHD-related behaviors. Conversely, Flemish teachers had more heterogeneous beliefs, suggesting they may not share a clear culture yet. They nevertheless subscribed mainly to political/cognitive and sociocultural dimensions of ADHD, which are related mainly to the sociological perspective, and usually associated with a strong antipathy toward medicalizing children's behaviors (Malacrida, 2004). Flemish teachers thus seem more likely to think ADHD is external and that interventions should target the context, not the child.

This pervasiveness of biomedical beliefs about ADHD in Québec and differences with Flanders could be reinforced by institutional factors, notably school's accountability policies and behavioral management practices, in addition to public policy agendas and access to health resources. Previous studies have shown that accountability laws add pressure on schools to improve students' performance (Bokhari and Schneider, 2011). Medicalization, through giving more ADHD diagnoses and medication use, is

thus one of the solutions to reach performance targets, either by helping students achieve their “full potential,” or by medically addressing the social inequalities that exist before the school entry.

Educational policies regarding the management of children with behavioral, emotional, or learning difficulties may also, as an element of an organizational culture, favor (or limit) medicalization. In Flanders, pedagogical management strategies are preferred for children suspected of having ADHD. Teachers are expected to do everything in their power to remedy children’s behavioral and academic difficulties, often in consultation with parents and the school’s care support team (Prodia, 2018). Only when the problems persist and the teacher can administratively prove that all options of remediation have been depleted, an external institution, the Centre for Student Guidance, is contacted in consultation with the parents. In Québec, teachers disengage rather quickly from pedagogical practices and turn to psychomedical management when confronted with children whom they suspect of having ADHD (Brault and Degroote, 2021).

Signs of medicalization at the interactional levels

A notable difference with Flanders is that Québec’s schools welcome a diversity of professionals expected to detect and assess potential problems (including ADHD) in their students. Among them, psychologists, and some nurses and guidance counselors, have been allowed to deliver clinical ADHD diagnoses since 2009, however, they cannot prescribe medication (Gouvernement du Québec, 2009; Institut National d’Excellence en Santé et Services Sociaux [INESSS], 2017). These examples demonstrate that medicalization also occurs at the interactional level in Québec, where health professionals are involved mainly in officially defining and explaining a problem using their medical knowledge (Conrad, 1992). This may even be promoted by public policies emphasizing early predictive screening, asking preschool teachers to help identify students with difficulties (Parazelli et al., 2021). Moreover, Québec has strong ADHD advocacy groups, associations, and doctors (CADDRA, Clinique FOCUS, etc.) promoting this idea through workshops in schools, families, and clinics.

Regional and national health care systems determine access to health care and mediate the definitions of ADHD and choices of treatments (Conrad et al., 2018). In Flanders, children are preferably diagnosed by a multidisciplinary team of medical professionals (neurologists, pediatricians, psychologists, etc.). In Québec, a greater prevalence of ADHD is associated with greater access to general practitioners: They are more accessible than specialists (pediatrician, psychiatrist), and contrary to (neuro)psychologists, they can prescribe medication, which they may do even when they have doubts about ADHD (INESSS, 2017). Furthermore, only 30% of youth diagnosed with ADHD have access to public or private psychosocial services (INESSS, 2017). This may explain why medication is often the only solution to ADHD-related behaviors, especially since the public and private health insurances reimburse these medications. Conversely, Flemish health insurance companies reimburse ADHD medication only when appropriate psychological, educational, and social measures have proven insufficient to control the symptoms and when treatment by medication is part of a global multidisciplinary treatment plan (Zorgpad ADHD, 2021).

Strengths and limitations

The strength of our study lies in its comparative and international design, which allowed the same measurements for Flanders and Québec and included teachers' and parents' assessments of the same child. The inclusion of suspicion along with more objective measures of ADHD is also innovative because prevalence was compared at various stages of the medicalization process. Nevertheless, it is still possible that the regional differences observed in the prevalence of ADHD diagnoses, suspicion, and treatment are due to the samples' characteristics. The student samples were similar on many characteristics but differed on ethnic background and academic achievement, two variables known to be associated with risks for ADHD suspicion or diagnoses. Ethnic minorities are usually less labeled and diagnosed than the ethnic majority (Thompson et al., 2020), which could explain the lower prevalence in Flanders, where the proportion of immigrants was higher. Further comparative research with larger sample sizes are needed to determine how these variables influence regional disparities in ADHD prevalence. It is important to emphasize that we have measured teachers' subjective assessments, but we were not able to measure actual behavioral differences between children. Thus, if teachers' assessments would indeed reflect actual behavioral differences, then it is possible that Flemish children are more hyperactive because less children take ADHD medication or because they have more often other behavioral disorders than ADHD compared to Québec children. Another limitation is that we collected information on first to third grades only in Belgium. This choice was based on the literature (ZitStil Kenniscentrum, 2015). Nevertheless, it is possible that students in higher grades are more suspected, when learning becomes more difficult and tougher discipline is required. Finally, teacher training concerning ADHD was raised as a potential explanatory factor in regional differences in teachers' assessment of children's behaviors (Couture et al., 2003). Since the content of teacher training programs has evolved over time and differs from one educational institution to the next, this is a challenge that has yet to be addressed.

Conclusion

Our paper contributes to the discussion on ADHD from a global perspective and helps understand it from the viewpoint of the social sciences (Bergey et al., 2018). Our interpretation of the striking disparities in ADHD diagnoses, medication, and suspicion between Flanders and Québec highlights the importance of a cultural reading of children's behaviors and difficulties. We also discussed the different levels at which medicalization of deviant behaviors may be occurring in schools and societies. As more studies are pointing toward an overdiagnosis of ADHD in children (Kazda et al., 2021), understanding contextual factors and teachers' beliefs is important to help reduce it in the near future.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by the Social Sciences and Humanities Research Council of Canada (430-2017-00926) and the Fonds de recherche Québécois sur la société et la culture (FRQSC) (2018-NP-204941).

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