



# Evidence-Based Practice in Child and Adolescent Mental Health

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## Paging Dr. Google: Availability and Reliability of Online Evidence-Based Treatment Information about ADHD

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### ABSTRACT

It is becoming increasingly common for caregivers and patients to search for health and mental health information on the Internet. Although there is a sizable scientific literature outlining an evidence-based approach to managing Attention Deficit Hyperactivity Disorder (ADHD) in children and adolescents, it is not clear how much of the online information about the disorder and its treatment aligns with evidence-based practice. The goal of this study was to conduct a review of online information about ADHD treatment and to systematically analyze this information with respect to accountability, presentation, content and alignment with evidence-based practice, and readability. Thirty-one ADHD-themed websites identified by three common Internet search engines were coded using a set of standardized criteria. Results indicated that the quality of information about ADHD treatment was generally poor, with websites meeting less than half the standardized criteria. Alignment with evidence-based practice was especially poor; most websites did not discuss psychosocial treatments and very few mentioned the treatment guidelines produced by the American Academy of Pediatrics. Flesch-Kincaid reading level was, on average, much higher than the recommended grade 8 level. Results indicate that, although conducting online searches about ADHD treatment could be beneficial in the context of shared-decision making, it is important for clinicians and caregivers to understand the limitations of this approach and to continue to engage in evidence-based treatment of ADHD to ensure positive outcomes for children and adolescents with the disorder.

Evidence-based practice (EBP) of psychological treatments refers to the “conscientious, explicit, and judicious use of the best available research evidence to inform each stage of clinical decision-making and service delivery” (Dozois et al., 2014, p. 155). Engaging in EBP requires the clinician to rely on multiple sources and levels of evidence when making decisions regarding treatment planning, with the most important and valuable evidence being meta-analyses or systematic reviews published in peer-reviewed journals (APA Presidential Task Force on Evidence-Based Practice, 2006; Dozois et al., 2014).

Although a balanced and evidence-based approach is recommended when discussing treatment options for psychological difficulties and disorders with clients/patients and their caregivers, the Internet has changed the way in which people seek out health-related information (see Reavley & Jorm, 2010 for a review). It is becoming increasingly common for

people to search for health and mental health information using search engines such as Google (Nichols, 2017; Reavley & Jorm, 2010; Reynolds et al., 2015) and to use this information to independently make decisions about the type of treatment they would prefer to obtain before even visiting a health professional (Montoya et al., 2013). Nichols (2017) acknowledges that the Internet has made research easier for members of the academe but cautions that it can be difficult for untrained people to accurately judge the veracity of the information or the reliability of the source. In fact, the source’s popularity often trumps credibility, such that celebrities, “influencers”, and popular news personalities become primary sources of online information and more scholarly work is often viewed as boring or not as enticing to the reader (Nichols, 2017). This is problematic in the context of finding evidence-based health and mental health information online, as much of the information found on Internet-based

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health and mental health sites is not evidence-based (Kisely et al., 2003; Mitchell & Read, 2012).

One area of clinical psychological practice for which there is a large body of literature to guide an evidence-based approach to treatment is Attention Deficit Hyperactivity Disorder (ADHD). ADHD is the most common neurodevelopmental disorder of childhood, with prevalence rates ranging from 8% to 12% of the childhood population (see Visser et al., 2013; Wolraich et al., 2019). ADHD is characterized by developmentally inappropriate symptoms of inattention and/or hyperactivity/impulsivity, symptom onset prior to age 12, and impairment in at least two settings (American Psychiatric Association, 2013). Research has consistently indicated that children and adolescents with ADHD often experience academic difficulties (e.g., Altszuler et al., 2017; Arnold et al., 2020; Kent et al., 2011), peer relationship/social difficulties (e.g., Aduen et al., 2018; de Boo & Prins, 2007; McQuade & Hoza, 2008, 2015; Mikami et al., 2007; Ros & Graziano, 2018), and increased levels of conflict with parents and family (e.g., Altszuler et al., 2017; Churchill et al., 2018; Haydicky et al., 2015; Huang et al., 2018; Johnston & Lee-Flynn, 2011). Given the potential for poor long-term outcomes for children with ADHD, effective evidence-based treatment is essential to ensure the best possible outcomes for this group. Large, multi-site studies have concluded that the most effective treatments for ADHD are (1) behavioral therapies (i.e., behavioral parent training, behavioral classroom management, behavioral peer training, and – for adolescents – organizational training); (2) pharmacological therapies such as psychostimulant medications (e.g., methylphenidate); and (3) a combination of both (e.g., American Academy of Pediatrics, 2011; Canadian Pediatric Society, 2002; Evans et al., 2014, 2018; Jensen et al., 2001; MTA Cooperative Group, 1999, 2004; Pelham & Fabiano, 2008; Pelham et al., 1998; Wolraich et al., 2019). More specifically, the American Academy of Pediatrics (2011, 2019) recommends that (1) behavioral treatment alone should be the first line of treatment for young children (i.e., 4–5 years); (2) medication and behavioral treatment, *preferably* both, should be used to treat elementary-age children (i.e., 6–11 years); and (3) medications combined with encouragement to

engage in behavioral treatments or evidence-based training interventions (e.g., organizational training), *ideally* both, be used to treat adolescents (i.e., 12–18 years).

Despite the sizable literature and the existence of clinical practice guidelines detailing an evidence-based approach to ADHD treatment, many parents are concerned about giving their children a psychoactive medication over a long period of time (Canadian Pediatric Society, 2002). As a result, a multitude of non-evidence-based alternative treatments for ADHD are often used, including strategies such as dietary management, homeopathy, and vision therapy, among others. However, these alternative treatments are typically either completely ineffective or not as effective as evidence-based treatments and could potentially cause harm (Ahn et al., 2016; Foisy & Williams, 2011; Heirs & Dean, 2007). It is typically recommended that the diagnosing or treating clinician be prepared to discuss alternative treatments with parents if asked about them and should present a balanced approach based on scientific evidence (Canadian Pediatric Society, 2002).

Given the high prevalence rate of ADHD, it follows that this would be a frequently searched diagnosis among parents who wish to meet their children's treatment needs. However, it is not clear how much of the online information about ADHD treatment is aligned with evidence-based practice. In a systematic review of online information regarding ADHD treatment, Kisely et al. (2003) found that agreement with evidence-based treatment guidelines ranged from 14% to 54%, with only 50% of sites recommending follow-up clarification with a qualified health professional. In addition to the lack of evidence-based treatment guidelines on the sites they evaluated, Kisely et al. (2003) noted that many sites did not provide information about site ownership/sponsorship or content authorship, nor had they been updated or modified within the last month. Finally, Kisely et al. (2003) found that the majority of sites (i.e., 97%) were written at a much higher level than the typically recommended grade 6–8 level (see Government of Canada, 2019, July). These findings suggest that online information about ADHD may be inaccurate in terms of its alignment with evidence-based practice, that information sources may

not be reliable, and that this information should therefore be consumed with some degree of caution.

As noted previously, there are clear guidelines to direct the practice of clinicians working in the area of ADHD treatment (see American Academy of Pediatrics, 2011; Wolraich et al., 2019); however, if a collaborative approach to decision-making is to be employed, the clinician must be prepared to engage in a shared decision-making process with the patient (see Montoya et al., 2013). The current difficulty with this model of shared decision-making is that patients (i.e., parents/caregivers, in the case of ADHD) are increasingly looking to online sources of information to learn about mental health disorders and their treatments, without any clinical guidance (Reavley & Jorm, 2010). This can be problematic, as many easily accessible websites promote non-evidence-based or biased information about the best treatment for ADHD. For example, in a review of pharmaceutical company influence on ADHD websites, Mitchell and Read (2012) found that 37% of the websites they reviewed were sponsored by large pharmaceutical companies and tended to promote a biological or genetic model of the disorder over psychosocial and environmental factors. Although the purpose of Mitchell and Read (2012) study was not to explicitly examine website content alignment with evidence-based treatment recommendations, these authors noted that, due to the endorsement of a biogenetic model of ADHD on pharmaceutical company-funded websites, medication treatment is often promoted over evidence-based behavioral or psychosocial treatments. Somewhat surprisingly, there is a paucity of research examining the quality and alignment with the evidence-based practice of online information pertaining to ADHD intervention. The research that does exist in this area is out-of-date (e.g., Kisely et al., 2003) or searches were not conducted in English (e.g., Montoya et al., 2013).

With this in mind, the goal of the current study was to conduct a scoping review of online information regarding ADHD treatment and its alignment with evidence-based practice. Given the dynamic nature of the Internet and the increase in the use of online sources of information since the last review was published in 2003, it is necessary to update

existing research to determine the types of online information currently available to parents of children and adolescents with ADHD. Additionally, new clinical practice guidelines have been published (American Academy of Pediatrics, 2011) and updated (Wolraich et al., 2019) since Kisely et al. (2003) completed their review; the current study sought to include these guidelines in the standardized *pro forma* that was used by Kisely et al. (2003) to rate online information about ADHD. Updating and extending previous findings could assist clinicians such as psychologists and physicians in addressing misinformation and providing guidance regarding evidence-based interventions when discussing treatment options with parents/caregivers and patients.

## Method

### Site assessment

The current study used a methodology similar to that described by Kisely et al. (2003) to evaluate ADHD treatment information available to parents through Internet searches. Kisely et al. (2003) described the development of a standardized *pro forma* that was adapted for the present study, with the permission of the first author. Specifically, the *pro forma* assesses four major elements of each website: (1) Accountability (i.e., inclusion of information related to website ownership, authorship, and/or sponsorship); (2) Presentation (i.e., inclusion of headings, diagrams, and other elements to make website esthetically pleasing); (3) Content and Alignment with Evidence-Based Practice (i.e., inclusion of information about both pharmaceutical and behavioral approaches to treatment and alignment with current clinical practice guidelines); and (4) Readability (i.e., Flesch-Kincaid reading level score). The *pro forma* used in the current study was identical to the one used by Kisely et al. (2003), with the exception of four additional items: one in the *Presentation* section and three in the *Content and Alignment with Evidence-Based Practice* section. The item added in the *Presentation* section addressed whether hyperlinks on websites were functional. The three items added to the *Content and Alignment with Evidence-Based Practice* section were based on the American Academy of Pediatrics

Clinical Practice Guidelines for ADHD (2011; Wolraich et al., 2019) for treating ADHD in early-, middle-, and late-childhood/adolescence. The *pro forma* used in this study is presented in Table 2.

### Site selection and evaluation

As described in Kisely et al. (2003), a simple search term (i.e., ADHD treatment) was used, with no additional refinement of the term after the initial search. This was done to more closely resemble terms that would be used by parents to conduct Internet searches for ADHD treatment options and to mimic the results that would be available to a person with limited medical/psychology, literature searching, Internet, or computer knowledge (see Kisely et al., 2003).

Identical searches were conducted using the three most popular Internet search engines in Canada according to medium.com (i.e., Google, Bing, and Yahoo). To more closely emulate the type of search that might be completed by a parent/caregiver, two more searches using the terms in the “people also ask” section of the search results were also completed. Searches were conducted on a designated laptop computer that had been reformatted prior to the beginning of this study to ensure that searches were not influenced by previous academic literature searches. The cache was cleared after each search. Searches were conducted at two different time points, approximately 3 months apart to allow for website updates and/or changes and to refine the search strategy if needed.

Following the delivery of results by each search engine, the URLs from the first 20 hits from each search engine were copied into a spreadsheet to ensure access to the sites for evaluation purposes. The decision to limit website analysis to the first 20 hits is based on previous research suggesting that searchers rarely look beyond the first 20 hits when conducting Internet searches (see Farkas, et al., 2015). Sites were excluded from analysis if they were duplicates, inaccessible (i.e., paywall controlled or not found), did not contain information about ADHD treatment, were message boards/discussion forums, or were in languages other than English. The included sites were coded quantitatively by a research assistant (EC) using the *pro forma* described above. A second

coder (AC) independently evaluated all websites to assess the inter-rater reliability of the coding of extracted data.

In addition to the quantitative data collection, field notes were made in the spreadsheet to document the manner in which ADHD was presented (e.g., ad content, geared toward a specific gender or parent). The goal of including these field notes was not to facilitate a comprehensive qualitative analysis of the data but to make note of website features that could potentially help or hinder the reader’s understanding of the information presented on the site.

## Results

### Website description

Examination of websites indicated that almost half (45.2%) of the included sites contained advertisements. Although some websites included advertising for their own products (e.g., books and pamphlets about ADHD treatment, “Ask a Doctor” service), much of the advertising included on the evaluated sites was for commercial goods such as cars, make-up, and jewelry; naturopathic approaches to ADHD treatment such as compounds, herbs, dietary interventions, and allergy treatments; software for home computers; and astrology. Coders did not perceive sites to be geared to one gender over another with respect to visual representations or verbal examples, suggesting that content could be perceived as being written for both male and female audiences. Approximately half (51.6%) of the included sites contained photos of people; seven (43.8%) of these sites only contained photos of Caucasian adults and children, nine (56.3%) of them featured a broader representation of ethnicities. Aside from potential distractions caused by half of the sites containing paid advertising, the sites overall were well laid out with a simple design and easy to navigate layout that could appeal to a demographically broad audience. As discussed below, the language level and presence of a large amount of academic prose, however, meant that many sites were not presented in a manner consistent with knowledge dissemination to people without clinical training; this was perceived by raters as a potential barrier to broad

public consumption or uptake of the content presented.

### *pro forma scores*

After removing duplicate sites from the first 20 hits from each of the three search engines, 31 websites were retained that met inclusion criteria for this study (see Table 1). Data presented here are summary statistics and qualitative synthesis of the coders' field notes while reviewing the sites the second time the search was completed to ensure that the most recent versions of sites were included in the analyses. Only five (16%) sites had been revised within the 3-month timeframe of the first and second searches. In this study, and the same 31 sites appeared at the two search times. This indicates some degree of stability of the web content, whereas some areas of online content might be more prone to variability over time due to formatting and content changes, or websites that expire. The interrater reliability for the data presented was good ( $Kappa = 0.797, p < .001$ ). The percentage of decision agreement from two independent raters across all items for 31 websites was 89.93%.

Scale descriptive statistics and the percentage of time that each scale item was present are detailed in Table 2. With a possible range of *pro forma* scores from 0 to 25, and higher scores indicating quality and alignment to evidence-based practices, the total scores for the included websites ranged from 7 to 16 (see Table 1). As shown in Table 2, of all the subscales (i.e., Accountability, Presentation, Alignment to EBP, Readability, and Recommendation for Follow-up), the lowest total score was on the Alignment to EBP subscale.

**Accountability.** The mean score on the accountability subscale was 4.48 ( $SD = 1.53$ ) out of possible 9 points. Almost all sites (93.5%) disclosed site ownership and specified the date at which the site was last modified (80.6%); although very few sites (3.2%) had been modified in the last month. Most sites credited authors or contributors and provided sources for the information reported on the site; however, fewer sites clearly specified author credentials or noted author affiliation. A minority of sites disclosed sponsorships (e.g., from natural products companies or pharmaceutical companies).

**Presentation.** The mean score on the presentation subscale was 3.55 ( $SD = 0.89$ ) out of possible 5 points. All sites included headings to guide the reader through the site but very few (25.8%) included diagrams to explain concepts. Functioning hyperlinks to direct the reader to external sites were present on almost all sites. Almost half the sites contained advertisements.

**Alignment with evidence-based practice.** Consistent with previous findings (Kisely et al., 2003), alignment with evidence-based practice was generally poor. The mean score on the alignment with evidence-based practice subscale was 3.13 ( $SD = 1.89$ ) out of possible 9 points, making this the lowest score of all subscales. Although the majority of sites (80%) mentioned approved medications to treat ADHD and just over half (54.4%) mentioned teaching parents to use behavioral principles to manage ADHD, far fewer sites presented information consistent with current AAP guidelines advocating varying combinations of pharmaceutical and behavioral intervention depending on the child's age. Although there was mention of teaching parents to use behavioral strategies to manage ADHD, few sites provided specific information about the types of behavioral strategies (e.g., contingency management, behavioral parent training, organization training) that have been shown to be helpful for managing ADHD. Approximately a third of sites mentioned management of comorbid conditions (e.g., anxiety, learning disabilities).

**Readability.** Flesch-Kincaid scores ranged from 6.5 to 15.9, with a mean score of 11.5 ( $SD = 2.76$ ), much higher than the recommended level of 8. Fewer than 10% of sites were written at a reading level of grade 8 or below.

**Recommendation for follow-up.** Just over two-thirds of the sites (67.7%) included a recommendation to follow-up with a health professional for more information about ADHD management.

## Discussion

The purpose of the current study was to conduct a scoping review of online information regarding ADHD treatment to evaluate the quality of this

**Table 1.** Included websites and total scores on pro forma.

Website and address	Total <i>pro forma</i> score
<b>About Kids Health</b> <a href="https://www.aboutkidshealth.ca/Article?contentid=1923&amp;language=English&amp;utm_source=google-grant&amp;utm_medium=cpc&amp;utm_campaign=AKH%20Generic&amp;utm_term=ADHD%20Generic&amp;gclid=EAlaIqobChMIsbA7vPd5wIVg5OzCh0mugawEAYyAAEgJBefD_BwE">https://www.aboutkidshealth.ca/Article?contentid=1923&amp;language=English&amp;utm_source=google-grant&amp;utm_medium=cpc&amp;utm_campaign=AKH%20Generic&amp;utm_term=ADHD%20Generic&amp;gclid=EAlaIqobChMIsbA7vPd5wIVg5OzCh0mugawEAYyAAEgJBefD_BwE</a>	12
<b>ADDitude</b> <a href="https://www.additudemag.com/slideshows/treating-adhd-without-medication/">https://www.additudemag.com/slideshows/treating-adhd-without-medication/</a>	15
<b>ADDitude</b> <a href="http://www.additudemag.com/adhd-treatment-options-adult">www.additudemag.com/adhd-treatment-options-adult</a>	11
<b>CADDAC</b> <a href="https://caddac.ca/adhd/understanding-adhd/in-adulthood/treatment/">https://caddac.ca/adhd/understanding-adhd/in-adulthood/treatment/</a>	9
<b>CADDAC</b> <a href="https://caddac.ca/adhd/document/treatment-of-adhd-in-children/">https://caddac.ca/adhd/document/treatment-of-adhd-in-children/</a>	7
<b>Canadian Pediatric Society</b> <a href="https://www.cps.ca/en/documents/position/adhd-2-treatment">https://www.cps.ca/en/documents/position/adhd-2-treatment</a>	16
<b>CDC</b> <a href="https://www.cdc.gov/ncbddd/adhd/treatment.html">https://www.cdc.gov/ncbddd/adhd/treatment.html</a>	15
<b>CDC</b> <a href="https://www.cdc.gov/ncbddd/adhd/guidelines.html">https://www.cdc.gov/ncbddd/adhd/guidelines.html</a>	16
<b>CHADD</b> <a href="https://chadd.org/for-adults/medication-management/">https://chadd.org/for-adults/medication-management/</a>	11
<b>Cleveland Clinic</b> <a href="https://my.clevelandclinic.org/health/diseases/15253-attention-deficit-disorder-without-hyperactivity-add-in-adults/management-and-treatment">https://my.clevelandclinic.org/health/diseases/15253-attention-deficit-disorder-without-hyperactivity-add-in-adults/management-and-treatment</a>	9
<b>Different Brains</b> <a href="https://www.differentbrains.org/5-tips-dealing-adult-adhd/">https://www.differentbrains.org/5-tips-dealing-adult-adhd/</a>	9
<b>Douglas Mental Health University Institute</b> <a href="http://www.douglas.qc.ca/info/attention-deficit-disorder-causes-treatments">http://www.douglas.qc.ca/info/attention-deficit-disorder-causes-treatments</a>	9
<b>EdCan</b> <a href="https://www.edcan.ca/articles/myths-facts-about-adhd-in-children/?gclid=EAlaIqobChMlIfqj2_Xd5wIVBeDICH13ow4UEAAyBCAAEgKFWvD_BwE">https://www.edcan.ca/articles/myths-facts-about-adhd-in-children/?gclid=EAlaIqobChMlIfqj2_Xd5wIVBeDICH13ow4UEAAyBCAAEgKFWvD_BwE</a>	10
<b>Everyday Health</b> <a href="https://www.everydayhealth.com/adhd/guide/treatment/">https://www.everydayhealth.com/adhd/guide/treatment/</a>	16
<b>Healthline</b> <a href="https://www.healthline.com/health/adhd/treatment-overview">https://www.healthline.com/health/adhd/treatment-overview</a>	13
<b>Healthline</b> <a href="https://www.healthline.com/health/adhd/natural-remedies">https://www.healthline.com/health/adhd/natural-remedies</a>	15
<b>HealthLink BC</b> <a href="https://www.healthlinkbc.ca/health-topics/hw166083">https://www.healthlinkbc.ca/health-topics/hw166083</a>	13
<b>Healthy Children</b> <a href="https://www.healthychildren.org/English/health-issues/conditions/adhd/Pages/Determining-ADHD-Medication-Treatments.aspx">https://www.healthychildren.org/English/health-issues/conditions/adhd/Pages/Determining-ADHD-Medication-Treatments.aspx</a>	11
<b>HelpGuide</b> <a href="https://www.helpguide.org/articles/add-adhd/treatment-for-adult-adhd-attention-deficit-disorder.htm">https://www.helpguide.org/articles/add-adhd/treatment-for-adult-adhd-attention-deficit-disorder.htm</a>	11
<b>HelpGuide</b> <a href="https://www.helpguide.org/articles/add-adhd/treatment-for-childhood-attention-deficit-disorder-adhd.htm">https://www.helpguide.org/articles/add-adhd/treatment-for-childhood-attention-deficit-disorder-adhd.htm</a>	12
<b>MayoClinic</b> <a href="https://www.mayoclinic.org/diseases-conditions/adhd/diagnosis-treatment/drc-20350895">https://www.mayoclinic.org/diseases-conditions/adhd/diagnosis-treatment/drc-20350895</a>	15
<b>MayoClinic</b> <a href="https://www.mayoclinic.org/diseases-conditions/adult-adhd/diagnosis-treatment/drc-20350883">https://www.mayoclinic.org/diseases-conditions/adult-adhd/diagnosis-treatment/drc-20350883</a>	12
<b>NCBI</b> <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2518387/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2518387/</a>	10
<b>NHS</b> <a href="https://www.nhs.uk/conditions/attention-deficit-hyperactivity-disorder-adhd/treatment/">https://www.nhs.uk/conditions/attention-deficit-hyperactivity-disorder-adhd/treatment/</a>	11
<b>NIMH</b> <a href="https://www.nimh.nih.gov/health/topics/attention-deficit-hyperactivity-disorder-adhd/index.shtml">https://www.nimh.nih.gov/health/topics/attention-deficit-hyperactivity-disorder-adhd/index.shtml</a>	12
<b>PsychCentral</b> <a href="https://psychcentral.com/disorders/adhd/treatment-for-attention-deficit-hyperactivity-disorder-adhd">https://psychcentral.com/disorders/adhd/treatment-for-attention-deficit-hyperactivity-disorder-adhd</a>	15
<b>PsyCom</b> <a href="https://www.psycom.net/adhd-treatment">https://www.psycom.net/adhd-treatment</a>	11
<b>PsyCom</b> <a href="https://www.psycom.net/adhd-treatments-research">https://www.psycom.net/adhd-treatments-research</a>	8
<b>Team ADHD</b> <a href="https://www.team-adhd.com/adhd-treatment/">https://www.team-adhd.com/adhd-treatment/</a>	12
<b>Understood</b> <a href="https://www.understood.org/en/learning-thinking-differences/treatments-approaches/treatment-options/treatment-for-kids-with-adhd">https://www.understood.org/en/learning-thinking-differences/treatments-approaches/treatment-options/treatment-for-kids-with-adhd</a>	12
<b>WebMD</b> <a href="https://www.webmd.com/add-adhd/adult-adhd-treatment-overview">https://www.webmd.com/add-adhd/adult-adhd-treatment-overview</a>	12

**Table 2.** Evaluation of accountability, presentation, content and alignment with evidence-based practice, and readability of websites describing ADHD treatment.

Website Element	Percentage of Sites	Scale Mean (Standard Deviation)
<b>Section 1: Accountability (Maximum possible score = 9)</b>		4.48 (1.53)
Were authors/contributors credited?	67.7	
Were author/contributor affiliation(s) provided? (e.g., University, Hospital, Clinic)	29	
Were author/contributor credentials provided? (e.g., MD, PhD)	45.2	
Were information sources provided?	54.8	
Were references provided/hyperlinked?	64.5	
Was site ownership disclosed?	93.5	
Was sponsorship disclosed? (e.g., pharmaceutical company, natural products company)	9.7	
Was site modified in the last month?	3.2	
Was date created/last modified specified?	80.6	
<b>Section 2: Presentation (Maximum possible score = 5)</b>		3.55 (0.89)
Were headings provided to guide the reader through the site?	100	
Were diagrams provided to explain concepts?	25.8	
Were advertisements absent?	54.8	
Were hyperlinks to external sites present? (i.e., did the authors provide follow up through hyperlinks?)	93.5	
Did hyperlinks work? <sup>§</sup>	80.6	
<b>Section 3: Content and Alignment with Evidence-Based Practice (Maximum possible score = 9)</b>		3.13 (1.89)
Mentions approved medications to treat ADHD (e.g., Ritalin, Adderall, Strattera, Concerta, Vyvanse)	80	
Mentions antidepressants for 2 <sup>nd</sup> line treatment (e.g., Wellbutrin)	35.5	
Mentions contingency management (e.g., point systems, time-out, response cost, daily report cards)	19.4	
Mentions behavioral therapy (i.e., parents and/or teachers are taught to use behavioral principles)	54.8	
Mentions behavioral parent training (i.e., parents are taught child management skills)	38.7	
Mentions behavioral parent-or teacher-administered behavioral treatment as the first line of treatment for young children (i.e., 4–5 years) <sup>§</sup>	22.6	
Mentions approved (i.e., FDA/Health Canada/other government regulatory body) medications and/or parent-administered behavior treatment and/or teacher-administered behavioral treatment, <i>preferably</i> both, for elementary-age children (i.e., 6–11 years) <sup>§</sup>	19.4	
Mentions approved (i.e., FDA/Health Canada/other government regulatory body) medications and possibly behavioral treatments, <i>ideally</i> both, for adolescents (i.e., 12–18 years)for adolescents (i.e., 12–18 years) <sup>§</sup>	9.7	
Mentions management of comorbid conditions (e.g., anxiety, depression, learning disabilities)?	35.5	

(Continued)

**Table 2.** (Continued).

Website Element	Percentage of Sites	Scale Mean (Standard Deviation)
<b>Section 4: Readability (Maximum possible score = 1)</b>		0.1 (0.3)
Mean (SD) Flesch-Kincaid score*		11.5 (2.76)
Flesch-Kincaid score < 8?	9.7	
<b>Section 5: Follow-Up (Maximum possible score = 1)</b>		0.68 (0.48)
Is there a recommendation to follow-up with a health professional (e.g., psychologist, GP, pediatrician)?	67.7	
<b>Mean Overall Score (Maximum possible score = 25)</b>		11.94 (2.49)

<sup>§</sup>Item represents addition to original *pro forma* developed by Kisely et al. (2003).

\*Flesch-Kincaid Grade Level Score is calculated using the following formula:  $(.39 \times \text{ASL}) + (11.8 \times \text{ASW}) - 15.59$  where ASL = average sentence length (i.e., the number of words divided by the number of sentences) and ASW = average number of syllables per word (i.e., the number of syllables divided by the number of words).

information and its alignment with evidence-based practice. Using a standardized *pro forma* modified from an earlier study (Kisely et al., 2003), 31 ADHD websites were evaluated across four domains: (1) Accountability, (2) Presentation, (3) Content and Alignment with Evidence-Based Practice, and (4) Readability. Websites were generally found to be presented and laid out well, with authors credited, clear acknowledgment of information sources, and functioning hyperlinks to take readers to external sites for further information. However, the majority of sites presented little information about well-established evidence-based treatments for ADHD, and content was often presented using complex and inaccessible language. The quality of online ADHD treatment information was generally poor, with websites, on average, meeting less than 50% of the criteria on the *pro forma*. This is consistent with Kisely et al. (2003) findings, as well as with more recent findings (e.g., Mitchell & Read, 2012), suggesting that the availability of good quality information about ADHD treatment does not appear to have changed in the years between these studies, even as the use of the Internet to search for health and mental health information has increased significantly.

With respect to accountability, results indicated that the majority of sites credited authors, provided author credentials and affiliations, and provided information sources, references, and links to additional information, all of which have been



identified as important factors when evaluating the quality of health information on the Internet (see Phillips, 2020). However, one important area of accountability, namely sponsorship disclosure, was found to be lacking on almost all of the websites that were evaluated. Although website sponsorship was not investigated further as part of the current study, the lack of information available regarding website sponsorship is a somewhat concerning finding, since previous research has indicated that over one-third of ADHD information websites are funded by pharmaceutical companies (see Mitchell & Read, 2012). Moreover, information about ADHD and its treatment on drug company-funded websites tends to be skewed toward bio-genetic explanations for the disorder, rather than a bio-psycho-social model that considers multiple factors in the development of the disorder (e.g., Mitchell & Read, 2012; Richards, 2013). Not only does the promotion of a bio-genetic model tend to place the responsibility for ADHD symptoms on the individual child, rather than on the interaction of the child with his or her environment, but it could lead to the promotion of medication as the sole treatment modality for ADHD, meaning that caregivers are not provided with information about the multimodal treatment approaches that have been found to be effective for ADHD in the long term (e.g., Adesman, 2003; Evans et al., 2018; Greenhill et al., 1996; MTA Cooperative Group, 1999; Pelham & Fabiano, 2008; Wells et al., 2000). When searching for information about ADHD treatment online, caregivers should be aware of website sponsorship to allow them to make informed decisions about the information they are reading and how it might relate to their child's treatment.

Another concerning finding was in the area of alignment with evidence-based practice, the subscale that produced the lowest mean score on the *pro forma*. Although most websites mentioned approved medications as a treatment for ADHD, far fewer sites discussed evidence-based behavioral strategies, such as contingency management, parent/teacher management training, and behavioral therapy to treat ADHD. Furthermore, sites generally did not promote the treatment guidelines produced by the American Academy of Pediatrics (2011, 2019); this is concerning, as caregivers searching the Internet for treatment

options for ADHD could become convinced that medication is the only and/or most effective treatment option for their child, rather than the multimodal approach that is generally accepted as most effective by clinicians and researchers in the field. Presenting medication as the most effective treatment for ADHD could lead caregivers to choose this option exclusively and could make them much less likely to use behavioral approaches to manage the disorder, even though the use of behavioral treatments has been shown to decrease problem behaviors associated with ADHD (Fabiano et al., 2009; Pelham & Fabiano, 2008; Pelham et al., 2016; Pelham & Waschbusch, 1999) and to decrease the need for high doses of psychostimulant medications in children with ADHD (e.g., Pelham et al., 2016). Research has also shown that parents who are provided with medication as a first-line treatment for their child's ADHD are much less likely to adhere to subsequent behavioral treatment, as opposed to parents who are provided with behavioral treatment as a first-line treatment (Pelham et al., 2016). The focus on medication and lack of information about behavioral treatments on the evaluated websites could encourage parents to request medication for their child, rather than exploring all possible treatment options. Overall, the poor alignment with evidence-based practice is unfortunate, given that the Internet has become a key source of health and mental health information for parents. It is incumbent upon the associations/organizations who manage and sponsor these websites to provide information about the range of treatments available and to present the medication as one possible option. As noted above, given that website sponsorship was not declared in most cases, it is difficult to know whether websites that neglected to mention behavioral approaches to treatment had received funding from drug companies.

Readability was also identified as a shortcoming for most of the included websites. Specifically, the mean Flesch-Kincaid grade-level score across all evaluated sites was grade 11.5, which is much higher than the recommended reading level of grade 6–8 (see Government of Canada, 2019, July). Fewer than 10 of the evaluated websites were written at a level of grade 8 or below and graphics/diagrams to describe concepts were used on very few sites, suggesting that information about ADHD treatment is largely only accessible to

parents/caregivers and/or patients with high reading levels and, in many cases, the ability to understand academic and technical language. If clinicians and researchers wish to provide accurate and evidence-based information to families challenged by ADHD, it is essential to do so in an equitable fashion and to ensure that information is provided using plain, simple, and non-academic language.

Qualitative observations of the included websites indicated that approximately half of the included websites contained advertisements for products including cars, make-up and jewelry, naturopathic/natural approaches to treatment (e.g., herbs, compounds, dietary interventions, allergy treatments), computer software, and astrology. Although many of these products seem to be relatively benign at first glance, it is concerning that several websites contained advertisements for “natural” treatments for ADHD, when this approach has not been shown to be evidence-based (Canadian Pediatric Society, 2002; Heirs & Dean, 2007); the presence of this type of advertising on websites containing information about the disorder could lend credibility to these treatments and encourage caregivers to purchase them or to become skeptical of the approved medications or behavioral treatments for ADHD. Finally, it is possible that some readers might find excessive advertising distracting, thereby detracting from the overall flow of the websites and making it difficult to read the information in a cohesive manner.

### **Clinical implications**

The results of this study have implications for clinicians working with children and families challenged by ADHD. It is essential for clinicians to be aware of the overall poor quality of ADHD information on the Internet, even when the information is found on reputable sites. Being aware of the type of online ADHD information available to parents will allow clinicians to take a more collaborative approach to management and to meet families “where they are” when discussing evidence-based approaches to treatment. As noted previously, to be collaborative, clinicians must be prepared to engage with patients and to present decision-making as a shared task (see Montoya et al., 2013). With this in mind, the diagnosing or

treating clinician might wish to ask parents whether they have completed an online search for ADHD and/or its treatment; if they have, the clinician should ask what their understanding of the disorder and treatment options are to determine the best approach to shared decision-making with appropriate guidance about evidence-based treatment.

Although the purpose of this study was not to investigate drug company sponsorship of the evaluated websites, it is important for diagnosing and treating clinicians to be aware that sponsorship of many websites is not disclosed and that it is possible that these sites have at least some association with pharmaceutical companies. Previous researchers (e.g., Mitchell & Read, 2012) have suggested that clinicians be clear with patients regarding the role of drug companies in dictating treatment approaches and this suggestion is echoed here, especially given some of the side effects associated with the administration of psychostimulant medications in children with ADHD. Clinicians should be encouraged to examine online information critically and to examine their own biases to ensure that they are engaged in a comprehensive discussion of treatment options rather than opting for a “quick-fix” that might not offer long-benefits to the child or family (see Mitchell & Read, 2012 for an excellent discussion).

Results of the current study also indicated that, overall, the language used on the evaluated websites was technically advanced and written at a grade-level much higher than the recommended grade 8 reading level. Clinicians should be aware of this when working with families, not just as a means of clarifying any misunderstanding of online information, but to ensure that they use plain language and avoid technical language when outlining treatment options. This is important even when parents and families have achieved a high level of education, as they may be unfamiliar with discipline-specific language and jargon that is often used by psychologists and physicians when discussing ADHD. Despite the access to information about ADHD afforded by the Internet, clinicians should not assume that parents have a comprehensive understanding of the disorder and should be prepared to have non-technical discussions about treatment as part of the shared decision-making process.

The findings of the current study suggest that improvement is needed to much of the online information about ADHD and its treatment. Although the *pro forma* developed by Kisely et al. (2003) and modified by the current authors could be used as a guide to developing an effective website, some specific recommendations are offered here to assist organizations and institutions interested in developing websites focused on disseminating information about ADHD and its treatment. First, we recommend consulting with an ADHD expert (e.g., clinical psychologist, psychiatrist, pediatrician) before developing website content. It is recommended that the expert be consulted during the website development phase and that the expert review content prior to the website going live to ensure that only evidence-based information is presented. All experts should be cited appropriately, and their credentials clearly displayed. Second, it is essential that all treatment recommendations included on ADHD information sites be aligned with the most up-to-date standards of evidence-based care (e.g., Wolraich et al., 2019 for the AAP Subcommittee on Children and Adolescents with Attention Deficit Hyperactivity Disorder). Websites should not promote a bio-genetic model of ADHD over a psychosocial model to ensure that pharmaceutical treatments and behavioral treatments/training are given equal consideration. Third, website content should be written at a Flesch-Kincaid level of 6–8 to ensure that information is accessible to parents/caregivers and patients of varying literacy levels; it is important to note that, even though a parent/caregiver or patient may have a high level of education and/or literacy, they might not be familiar with the medical and/or psychological terminology associated with ADHD. Website developers are encouraged to evaluate the Flesch-Kincaid level of site content prior to the site going live. Fourth, website sponsorship (or expert affiliation with sponsors) should be displayed clearly to ensure that readers are aware of any possibility of bias in the information presented on the site. Fifth, all links included on websites should be functional and should link to reputable (i.e., evidence-based) sites or articles. Finally, websites should be reviewed frequently and updated accordingly when new clinical practice guidelines are released or when advances in evidence-based practices occur.

## Limitations

There are some limitations to the current study that should be addressed. First, message boards and online forums were excluded from the analysis; the decision to exclude message boards and forums was two-fold. Specifically, the methodology of the current study was based on that of Kisely et al. (2003) who also excluded message boards and forums from their search; given that it was of interest to know whether the quality of online information about ADHD had changed in the intervening years, a decision was made to adhere as closely as possible to the original methodology. Additionally, given that many message boards and forums are now based in private groups hosted by social networking sites, it was deemed ethically complicated to request membership in one or more groups for the purposes of analyzing the content of member posts. Second, formal ratings of incidental website content (e.g., advertisements, diverse representations of people affected by ADHD) were not included, and only field notes were made. Future studies should consider including formal coding of incidental content to ratings of website quality, as the presence of this content could hinder understanding of websites or could fail to attract readers. Finally, although the *pro forma* included an item related to sponsorship disclosure, the current study did not specifically evaluate the number of sites with pharmaceutical company sponsorship; although this was not the main objective of the study, it would have been helpful to know how many sites were sponsored by pharmaceutical companies; this information could have facilitated comparisons of the content of sponsored as compared to non-sponsored sites.

## Conclusion

Consistent with previous research, the current study found that the quality of online information about ADHD was generally poor and that it often did not align with current evidence-based approaches to treatment. Improvements to websites such as simplified language and removal of technical/academic jargon, the use of graphics and visuals to present information, removal or minimization of distracting advertisements to facilitate attention to content, and

refusal of advertisement content that is counter to an evidence-based approach to management could improve parents' knowledge of the disorder and its treatment. However, it is ultimately incumbent on the diagnosing and/or treating clinician to be aware of the poor quality of online ADHD information and to ensure that comprehensive discussions of ADHD management include the dissemination of evidence-based information in a collaborative way. By collaborating with parents/caregivers and patients and acknowledging their agency in the decision-making process, we can ensure the best possible outcomes for children and youth challenged by ADHD.

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