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The reading practices of people with neuropsychiatric disabilities

A review of library and information science literature

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The reading practices of people with neuropsychiatric disabilities: a review of library and information science literature

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Abstract

Introduction. The ability to read and interpret different types of text can be significantly impacted by neuropsychiatric disabilities, which affect cognitive abilities. This paper explores and reviews previous studies within library and information science on neuropsychiatric disabilities in relation to reading practices.

Method. Searches were performed in LISA and LISTA to identify research on readers with neuropsychiatric disabilities. Results were screened and 14 peer reviewed articles were chosen for inclusion. Utilising content analysis, the examined articles were deductively and inductively categorised according to the following themes: *impairment, user group and context, research design, assistive technologies for reading, reading for information seeking, reading for evaluation*, and *reading, self-efficacy and identity*.

Findings. Most articles address dyslexia. The majority of studies have been conducted in educational settings and have an experimental research design. Six studies address assistive technologies for reading, the remaining eight concern reading in relation to information practices.

Conclusion. There is an imbalance in the types of impairments that have been addressed in previous research. Few studies concern everyday reading practices and more research outside of educational contexts is needed. Furthermore, there is a lack of research that delves deeper into the experiences of readers with neuropsychiatric disabilities.

Introduction

In order to function and navigate in contemporary societies, people need to be able to read. In the past few decades, as the landscape of written text has become increasingly digital, people's reading practices have changed. However, digital development has not necessarily led to increased accessibility for people with print disabilities, that is, with difficulties reading standard print or digital text.

The focus of this paper is the reading practices of people with print disabilities stemming from conditions that, in a Swedish context, are often referred to as *neuropsychiatric disabilities* (neuropsykiatriska funktionsnedsättningar). The Swedish definition of Neuropsychiatric disabilities includes attention deficit hyperactivity disorder (ADHD), attention deficit disorder (ADD), autism, dyslexia, Tourette syndrome, and developmental language disorder (National Board of Health and Welfare, 2022). While there are different ways of classifying neuropsychiatric disabilities, what ADHD, ADD, autism, dyslexia, Tourette syndrome and developmental language disorder all have in common is that they affect cognitive abilities, involving perception and executive functions, thereby potentially impacting reading. It is not uncommon for these diagnoses to co-occur, in combinations that can amplify the difficulties faced by the individual, including the ability to read (The National Agency for Special Needs Education and Schools, 2023). Worldwide, it is estimated that 84.71 million people have ADHD and 28.32 million have autism spectrum disorder (Our World in Data team, n.d.). It is also estimated that around 10 per cent of the world's population has dyslexia (Dyslexia Association of Ireland, n.d.).

In Sweden, individuals diagnosed with neuropsychiatric disabilities have the right to various kinds of welfare and educational support, including assistive technologies for reading. This support is administered through school, public and university libraries. There are indications that awareness of support for reading difficulties caused by neuropsychiatric disabilities has increased. For example, in Swedish universities, the number of students who have been granted disability study support because of a neuropsychiatric disability has increased significantly in the past decade (Stockholm University, 2024). Thus, librarianship increasingly entails reducing barriers to reading for people with neuropsychiatric disabilities. To improve support and strengthen accessibility, there is a need for studies on this user group's reading practices. Therefore, we aim to synthesise the available research within library and information science about these readers.

While previous literature reviews of library and information science have investigated how the discipline conceptualises disability and accessibility (Hill, 2013) and how various forms of impairments can affect information behaviour and information practices (Berget and MacFarlane, 2020), there are fewer literature reviews within the discipline on the reading practices of people with different types of impairments (e. g. Lundh and Johnson, 2015) Furthermore, many previous studies have shown an interest in users with vision impairments or blindness (Hill, 2013), rather than users with other types of impairment that could lead to print disabilities. Therefore, the aim of this paper is to provide an analysis of the reading practices of people with neuropsychiatric disabilities, as described in library and information science research. By taking an interest in reading *practices*, we draw attention to the *how* of reading, that is, people's reading as it takes place in concrete material settings (see Darnton, 2014/1986; Dolatkhah, 2011). This also includes activities that are often described as information seeking and searching in contemporary library and information science research, as such activities generally involve the act of reading. Thereby, it can be said that this study connects to the earliest user studies, where reading was a given empirical object (see Lundh et al., 2018, p. 1049).

The paper seeks to respond to the following four research questions:

- What types of impairments, user groups and contexts have been investigated in library and information science research on readers with neuropsychiatric

disabilities published between 2010 and 2023?

- What types of research designs have been employed in the reviewed research?
- What themes can be identified in the reviewed research?
- According to the reviewed research, how can the reading practices of users with neuropsychiatric disabilities be supported?

Method

This study constitutes a scoping review of library and information science research. Munn et al. (2018) describe the scoping review as a method of providing an overview of previous research and identifying knowledge gaps. A scoping review can also be used to determine the feasibility of conducting a full systematic review (Arksey and O'Malley, 2005). Database searches were performed in Library, Information Science & Technology Abstracts (LISTA) and Library and Information Science Abstracts (LISA) on December 11, 2023. These databases have been chosen because they are the most prominent databases for library and information science. Julien et al. (2011) highlight the practical usefulness of limiting the search to subject-specific databases to '*identify the body of work in the area*' (p. 20). As our aim is to review research solely within library and information science, no additional databases were searched. Free text terms related to reading, information behaviour, information practices, information seeking, and information searching were combined with terms for different kinds of neuropsychiatric disabilities, such as dyslexia, attention deficit hyperactivity disorder and autism (see Appendix 1). Searches were limited to peer reviewed articles in English during the time period January 1, 2010, to December 11, 2023. The motivation behind the limitation of only including studies published in 2010 or later was twofold. Partly, it was chosen to build Hill's (2013) study, which reviewed research published up until 2010. Moreover, the time limitation was selected in view of technological advances in assistive technologies for reading.

The database searches yielded a total of 270 articles after duplicate removal. All titles and abstracts were screened independently by the two first authors. 23 full text papers were appraised, and 14 papers were selected for inclusion in the review. Primary studies on users with some kind of neuropsychiatric disability and their reading practices were included. Studies which solely focused on the perspectives of parents or relatives of children with neuropsychiatric disabilities were excluded. Literature reviews and other secondary sources were excluded, as well as articles from trade journals and monographs. For a visualisation of the selection workflow, see Figure 1.
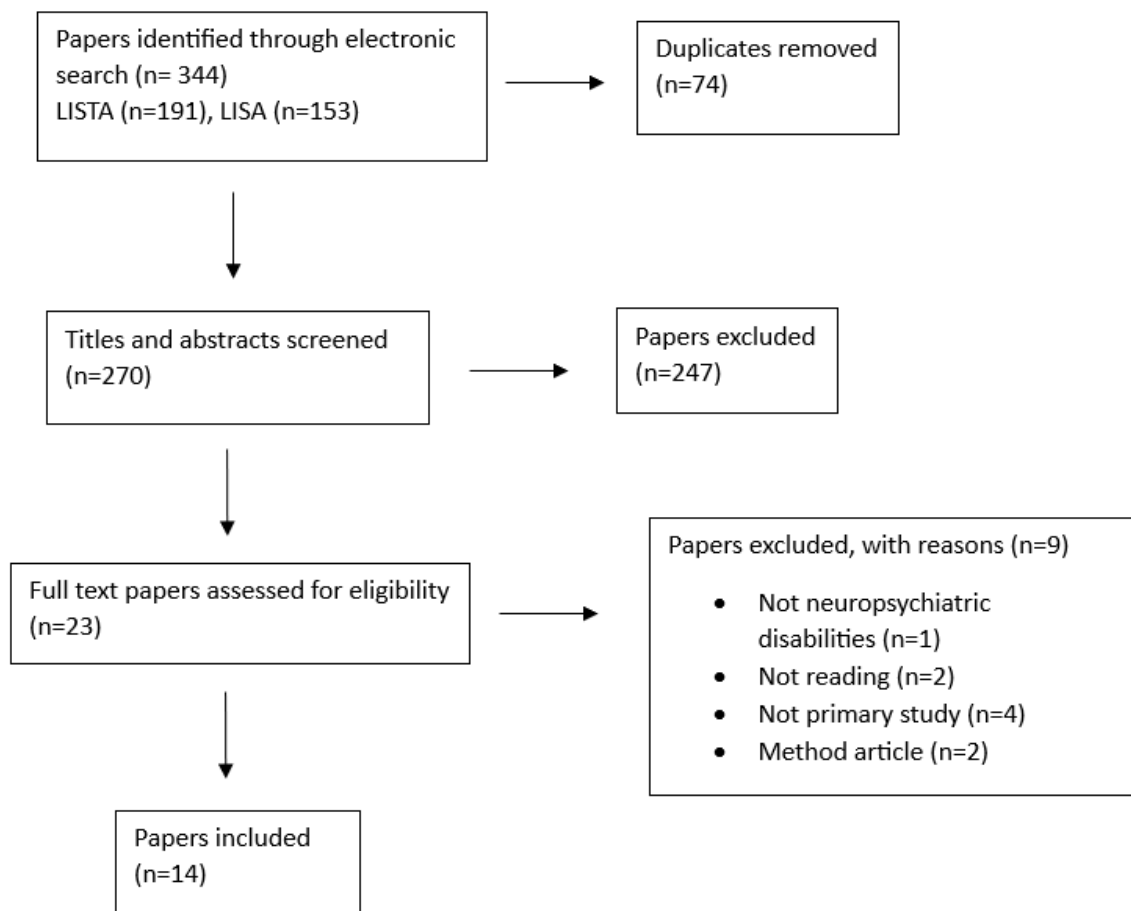
Figure 1. Flow chart of the selection process

The selected studies, as listed in Table 1, were categorised thematically through a combination of deductive and inductive content analysis, a systematic yet flexible method aimed at identifying patterns and underlying structures in the data (Schreier, 2012; 2014). Initially, the first two authors read the included studies. Subsequently, a deductive content analysis was conducted, focusing on three predefined themes: *impairment*, *user group and context*, and *research design*. These themes helped to differentiate and identify the orientation and focus of the studies. Following this initial analysis, a more in-depth review of the studies was carried out. This comprehensive examination involved an inductive content analysis, during which the following themes were identified: *assistive technologies for reading*, *reading for information seeking*, *reading for evaluation* and *reading, self-efficacy and identity*.

No	Author, year, and title
1.	Barden, O. (2014). Exploring dyslexia, literacies and identities on Facebook
2.	Benmarrakchi, F. & El Kafi, J. (2021). Investigating Reading Experience of Dyslexic Children Through Dyslexia-Friendly Online Learning Environment
3.	Berget, G. & Sandnes, F. E. (2015). Searching databases without query-building aids: implications for dyslexic users
4.	Berget, G. & Sandnes, F. E. (2016). Do autocomplete functions reduce the impact of dyslexia on information-searching behavior? The case of Google
5.	Beveridge, L., Makri, S. & MacFarlane, A. (2022). 'I'm just not sure.' The persistence of uncertainty in the information seeking of undergraduate students with dyslexia
6.	Brunow, D. A. & Cullen, T. A. (2021). Effect of Text-to-Speech and Human Reader on Listening Comprehension for Students with Learning Disabilities
7.	Chen, C. & Keong, M. (2017). Affording inclusive dyslexia-friendly online text reading
8.	Cole, L., MacFarlane, A. & Buchanan, G. (2016). Does dyslexia present barriers to information literacy in an online environment? A pilot study
9.	Kvikne, B. & Berget, G. (2021). In search of trustworthy information: a qualitative study of the search behavior of people with dyslexia in Norway
10.	MacFarlane, A., Al-Wabil, A., Marshall, C. R., Albrair, A., Jones, S. A. & Zaphiris, P. (2010). The effect of dyslexia on information retrieval
11.	Park, K., Kihl, T., Park, S., Kim, M.-J. & Chang, J. (2019). Fairy tale directed game-based training system for children with ADHD using BCI and motion sensing technologies
12.	Rello, L. & Baeza-Yates, R. (2017). How to present more readable text for people with dyslexia
13.	Sidhu, M. S. & Manzura, E. (2011). An Effective Conceptual Multisensory Multimedia Model to Support Dyslexic Children in Learning
14.	Yechiam, E. & Yom-Tov, E. (2021). Unique Internet Search Strategies of Individuals with Self-Stated Autism: Quantitative Analysis of Search Engine Users' Investigative Behaviors

Table 1. Studies analysed (full references can be found in the reference list)

Findings

In order to answer the first and second research questions, the reviewed studies are presented based on the themes identified in the deductive content analysis: *impairment*, *user group and context*, and *research design*. This is followed by a presentation of the inductive themes: *assistive technologies for reading, reading for information seeking, reading for evaluation* and *reading self-efficacy and identity*, which address the third research question. In this presentation, the included studies are summarised, and synthesised results of the studies are presented. This helps address the fourth research question regarding how reading practices can be supported, which is further discussed in the concluding discussion.

Impairment

The majority of studies included in the review, 12 out of 14, concern readers with dyslexia. This is perhaps unsurprising, as dyslexia has an immediate impact on the ability to process written text. One article addresses self-identified autism (Yechiam and Yom-Tov, 2021), and one study investigates readers with ADHD (Park et al., 2019). Additionally, two studies on dyslexia and information searching by Berget and Sandnes (2015; 2016), comprised of the same group of participants, included a small number of participants who were also diagnosed with ADHD and ADD. However,

possible impacts of ADHD and ADD were not discussed. No other neuropsychiatric disabilities were represented in the included studies.

User group and context

Eight of the 14 studies included were conducted in educational contexts, of which four were conducted in higher education settings, primarily undergraduate level (Berget and Sandes, 2015; 2016; Beveridge et al., 2022; Cole et al., 2016), and four in school settings (Barden, 2014; Brunow and Cullen, 2021; Chen and Keong, 2017; Sidhu and Manzura, 2011). The remaining s*fix* studies were conducted in miscellaneous contexts outside educational settings (Benmarrakchi and El Kafi, 2021; Kvikne and Berget, 2021; MacFarlane et al., 2010; Park et al., 2019; Rello and Baeza-Yates, 2017; Yechiam and Yom-Tov, 2021). However, three of these studies (Benmarrakchi and El Kafi, 2021; Park et al., 2019; Rello and Baeza-Yates, 2017) were conducted fully or partially on school-age children. Moreover, in three of the studies conducted outside educational contexts, most of the participants were either highly educated or students in higher education (Kvikne & Berget, 2021; MacFarlane et al., 2010; Rello and Baeza-Yates, 2017). In summary, most previous research on the reading practices of people with dyslexia, ADHD or autism has been conducted on readers who are either students or highly educated.

Most studies were carried out in Europe; four in the United Kingdom (Barden, 2014; Beveridge et al., 2017; Cole et al., 2016; MacFarlane et al., 2010), three in Norway (Berget and Sandnes, 2015; 2016; Kvikne and Berget, 2021) and one in Spain (Rello and Baeza-Yates, 2017). Three studies were conducted in Asia; two in Malaysia (Chen and Keong, 2017; Sidhu and Manzura, 2011), and one in South Korea (Park et al., 2019). The remaining studies were carried out in the United States (Brunow and Cullen, 2021; Yechiam and Yom-Tov, 2021), and Morocco (Benmarrakchi and El Kafi, 2021). This illustrates a clear Western focus in the reviewed studies.

Research design

A majority, nine of the 14 studies, have an experimental design, which means that the studies were conducted through predetermined tasks. Six of these studies concern reading and have a technical focus, in that the aim of the studies were to evaluate different assistive tools or technologies, such as fonts (Chen and Keong, 2017; Benmarrakchi and El Kafi, 2021; Rello and Baeza-Yates, 2017) text-to-speech (Brunow and Cullen, 2021) or interactive learning tools (Park et al., 2019; Sidhu and Manzura, 2011). The remaining three experimental studies investigate information searching online (Berget and Sandnes, 2015; 2016; MacFarlane et al., 2010).

Five studies have a naturalistic design, that is, they investigate reading practices in environments not specifically set up for the study. Beveridge et al. (2022) and Cole et al. (2016) both explore the information and reading practices of students in higher education with dyslexia through observation of the participants' online information searching, followed by interviews. However, some element of control was present in Beveridge's et al. (2022) study, where the participants' searches were controlled in the sense that they were conducted on the researcher's laptop for a maximum of 20 minutes. Kvikne and Berget (2021) interviewed participants with dyslexia about their experiences regarding online information searching. No search sessions were conducted during the study itself. A similar approach was taken by Yechiam and Yom-Tov (2021), who examined a data set from the search engine Bing to explore if users with self-stated autism examined more options in online information searching than users without autism. Kvikne and Berget's (2021) and Yechiam and Yom-Tov's (2021) are the only two studies that do not rely on users performing a given task, either directly or indirectly. Through action research and a case study, Barden (2014) explored the role of identities and affinities in supporting literacy for adolescents with dyslexia. This was implemented in a classroom setting through the joint creation of a Facebook page, through which the students gained a sense of belonging and agency through a shared dyslexic identity.

In summary, experimental research designs dominate the previous research on the reading practices of people with neuropsychiatric disabilities. There is also a strong technical focus: many of the studies aim to evaluate a tool or system.

Assistive technologies for reading

Six studies address assistive technologies for reading. Three of these studies (Benmarrakchi and El Kafi, 2021; Park et al., 2019; Sidhu and Manzura, 2011) develop new assistive technologies, while the remaining three (Brunow and Cullen, 2021; Chen and Keong, 2017; Rello and Baeza-Yates; 2017) test already existing tools.

Park et al. (2019) developed an assistive tool for reading, a fairy-tale and game-based training system, with the purpose of analysing and improving the reading skills of children with ADHD. The study involved children in first and second grade, all diagnosed with ADHD. The interactive content of the training system benefited the participants' reading abilities and attention levels and decreased their hyperactivity. The participants' parents also reported that their children had shown more interest in reading after the experiment. Sidhu and Manzura (2011) developed a learning tool for learning to read and write in Malay language, and this tool was tested on children with and without dyslexia. The authors report a slight improvement among 60 per cent of the participants, 30 per cent remained at the same level as before, and 10 per cent dropped to a lower level. However, Sidhu and Manzura (2011) do not clarify which participants their results apply to, those with dyslexia or all participants. Benmarrakchi and El Kafi (2021) designed and tested the dyslexia-friendly font *Arabiolexia* in comparison to *Simplified Arabic* (the most commonly used font in Arabic). While both children with and without dyslexia made more spelling errors in *Simplified Arabic* compared to *Arabiolexia*, the difference was most significant in the group with dyslexia. While both groups perceived *Arabiolexia* as easier to read, the test showed no significant gains in readability or reading comprehension.

Rello and Baeza-Yates' (2017) study also addresses the impact of font in relation to dyslexia. Their study tested the reading performance of adolescent and adult readers with and without dyslexia through an eye-tracking study followed by a questionnaire. Both the participants with dyslexia and the control group read faster with larger text fonts and larger character spacings. Chen and Keong (2017) investigated perceptions of different modes of presenting online text among readers with dyslexia. Readers, both with and without dyslexia, preferred the same text mode based on dyslexia-friendly guidelines. Most readers with dyslexia benefited from the addition of a screen reader to the dyslexia-friendly text mode, however, some readers found it distracting. Chen and Keong (2017) concluded that the dyslexia-friendly text presentation benefits all readers and that screen readers should be available as an option, but not as an obligatory feature. Brunow and Cullen (2021) also investigated text-to-speech. Their study aimed to compare and measure the effectiveness of text-to-speech and a human reader regarding listening comprehension among high school students with dyslexia. The students' comprehension was higher and more consistent for the human reader compared to text-to-speech. However, Brunow and Cullen (2021) concluded that text-to-speech could benefit students with reading difficulties if used as a supplement to teacher instruction.

As demonstrated by these studies, assistive technologies have only been investigated in experimental settings in the reviewed library and information science literature. While these studies do tell us something about the impact of assistive technologies on the reading performance of readers with neuropsychiatric disabilities, they tell us little about assistive technology in relation to their actual reading practices.

Reading for information seeking

Reading difficulties can affect information seeking in different ways, as information seeking and information searching generally involve the reading of written text. Several studies examine barriers that users with dyslexia face when searching online (Berget and

Sandnes, 2015; 2016; Beveridge et al., 2022; Cole et al., 2016; Kvikne and Berget, 2021; MacFarlane et al., 2010). When Berget and Sandnes (2015) gave university students, with and without dyslexia, search tasks in a library catalogue, users with dyslexia took longer to complete the tasks and formulated more queries in relation to each task than users without dyslexia. A similar pattern was observed by Berget and Sandnes (2016) when users were given search tasks in Google; the completion time was longer for those with dyslexia. However, the most significant difference in both studies was the number of spelling errors, which were notably higher among the users with dyslexia (Berget and Sandnes, 2015; 2016). Also, the search tools did not always make it clear to the user that a spelling error had been made. Therefore, Berget and Sandnes (2016) suggest that detailed feedback on the parts of a search query that did not yield any matches could improve the accessibility and user-friendliness for users both with and without dyslexia.

Searching in databases with a low tolerance for spelling errors, such as library catalogues, causes difficulties for users with dyslexia. When searching in this kind of database, users with dyslexia tend to turn to external websites to a greater extent than users without dyslexia due to this low tolerance (Berget and Sandnes, 2015). Systems that offer autocomplete can be of help, but a high tolerance for spelling errors might be even more important (Berget and Sandnes, 2016). Interviews with users with dyslexia (Berget and Kvikne, 2021) revealed that users started searching on Google because of its high tolerance for spelling errors despite stating other sources as more trustworthy. Another advantage of search engines such as Google is the ability to search using natural language (Kvikne and Berget, 2021). Spelling difficulties also impact the next stage of the information seeking process, i.e. choosing what sources to read.

Reading for evaluation

Critical evaluation of information poses a challenge for many users, and this challenge is further amplified for individuals with dyslexia. Kvikne and Berget (2021) noted that users with dyslexia expressed a preference for sources that they deemed trustworthy, such as encyclopaedias. However, such sources often lack features such as a high tolerance for spelling errors, making them less accessible. Additionally, assistive technologies and functions designed to aid readers with dyslexia are predominantly developed for widely spoken languages like English. This leaves readers of smaller languages with fewer resources (Kvikne and Berget, 2021).

In addition to evaluating the trustworthiness of sources, users also find assessing the relevance of information and reviewing lists of results to be challenging. This is among other factors due to the large amount of text (Kvikne and Berget, 2021). In their study, MacFarlane et al. (2010) explored a specific interface, Okapi, and noted that users with dyslexia viewed fewer documents compared to those without dyslexia. The authors speculate that this difference could be attributed to a slower reading speed among the users with dyslexia (MacFarlane et al., 2010). This observation also aligns with Kvikne and Berget's (2021) study findings, which suggest that the limited review of results stems from cognitive overload. MacFarlane et al. (2010) and Berget and Sandnes (2015) both suggest that users with dyslexia could benefit from visual information, such as images and icons, instead of written information in search results. However, this preference for visual information might not apply to all readers with neuropsychiatric disabilities. Yechiam and Yom-Tov (2021) investigated the online search behaviours of 1746 users with self-stated autism and compared them to a control group who had entered identical search queries in the search engine Bing. Users with self-stated autism scanned a higher number of results compared to the control group for text searches. The same difference was not observed for image searches, which the researchers attributed to image searches generating a higher visual load, which may be more challenging to process for people with autism. The suggestion that users with autism, unlike users with dyslexia, prefer written information over visual illustrates the heterogeneity of users with neuropsychiatric disabilities and that the diverse needs of

different users must be considered when designing for accessibility.

Reading, self-efficacy and identity

Three studies (Barden, 2014; Beveridge et al., 2022, Cole et al., 2016) address themes of self-efficacy and identity in relation to reading difficulties. Beveridge et al. (2022) and Cole et al. (2016) found that students with dyslexia perceived information seeking as challenging largely due to their low self-efficacy concerning reading. Both studies investigated information searching in educational contexts among students with dyslexia. Beveridge et al. (2022) make use of Kuhlthau's framework of the stages of the information seeking process, in which it is assumed that users move towards higher certainty as the information seeking process progresses (Kuhlthau, 1993). Beveridge et al. (2022) found that this student group reported high levels of uncertainty throughout the whole information seeking process. This persistent uncertainty was attributed to the students' low self-efficacy. Similarly, Cole et al. (2016) found that students with dyslexia struggled with evaluating and extracting information from the sources they found, which could be linked to low levels of self-efficacy concerning reading. These studies highlight the role that reading plays in the information searching process, and the relationship between reading ability and self-efficacy. A similar theme is explored by Barden (2014, p. 105), who discusses self-esteem in relation to dyslexia, arguing that the development of what he calls *dyslexic identities* can act as motivators for literacy activities among adolescents with dyslexia. This was demonstrated when adolescents with dyslexia created a joint Facebook page about dyslexia. The collaborative effort fostered the development of a group identity, which acted as a motivating factor. Additionally, recognition of one's own identity and the realisation that content is personally relevant can further enhance reading motivation. Barden (2014) found that the students' interest in the subject of dyslexia encouraged them to undertake readings of complex academic texts that they would otherwise have avoided.

These studies illustrate the large impact of dyslexia on readers' self-esteem and the importance of self-efficacy and motivation in undertaking challenging reading tasks. This can be achieved through both community building as well as support systems for readers with dyslexia.

Concluding discussion

The aim of this paper was to provide an analysis of the reading practices of people with neuropsychiatric disabilities, as described in library and information science research. In this final section we present and discuss the main findings and some overall conclusions from the study with a basis in the research questions.

Impairments, user groups and contexts

Dyslexia is by far the most investigated impairment in previous library and information science literature, with nine of the 14 articles included in this review investigating users with dyslexia. This is consistent with Berget and MacFarlane's review (2020), in which dyslexia and visual impairments were the most commonly researched impairments. The only other impairments addressed in the reviewed research are (self-stated) autism and ADHD, which are investigated in one study each (Yechiam and Yom-Tov, 2021; Park et al., 2019). No other neuropsychiatric disabilities are represented, illustrating a gap in the research.

In her review, Hill (2013) called for more user-centred library and information research, that is theoretically informed by disability theory and actually includes people with disabilities. Taking into account the narrower approach of this literature review compared to Hill's, it seems that this call has at least partly been answered. All 14 articles included in this review have a clear user focus and involve participants with disabilities. However, in the earlier stages of the selection process, we did note a number of articles which assessed accessibility without involving users with disabilities (e.g. Mune and Agee, 2016; Nganji, 2015), which were subsequently excluded. In addition, the literature search yielded ten articles addressing the information behaviours and needs of parents and families of children with neuropsychiatric disabilities, primarily autism and ADHD (e.g. Gibson and Hanson-Baldauf,

2019 Mahajan et al., 2014 Mohd Hussain et al., 2022). In comparison, only one article about the information practices of people with autism were identified (Yechiam and Yom-Tov, 2021), and no articles about the information practices of people with ADHD were found. This discrepancy illustrates that the information needs of the families of people with autism and ADHD have thus far been given much more attention by the library and information research community than the information needs of the people with autism and ADHD themselves. In light of the increase in the number of ADHD diagnoses (Xu et al., 2018), more research on this user group and their reading and information practices is needed.

There is also a scarcity of research conducted outside educational contexts. The few studies that have been conducted outside educational settings primarily investigate school children and students in higher education or highly educated people. It is questionable whether the predominantly highly educated participants of the studies included in this review are representative of the larger community of people with dyslexia, considering the fact that people with disabilities are less likely to have postsecondary education than people without disabilities (Statistics Sweden, n.d.). Moreover, there is a lack of studies investigating the everyday reading practices of children and adolescents with neuropsychiatric disabilities. Only one of the studies conducted in a naturalistic setting investigated participants below undergraduate level (Barden, 2014). The studies which address children and adolescents' reading (Benmarrakchi and El Kafi, 2021 Chen and Keong, 2017: Brunow and Cullen, 2021; Park et al., 2019; Sidhu and Manzura, 2011) are all experimental, thus telling us little about the participants' reading practices in other contexts.

While there is some plurality in the studies' countries of origin, there is a clear Western dominance, with most of the studies originating from the United Kingdom and Norway. This illustrates a need for more studies on the reading practices of people with neuropsychiatric disabilities carried out in other parts of the world, especially outside of the Germanic-language sphere. It is also striking that two authors, Berget and MacFarlane, have made a major contribution to the body of knowledge by co-authoring six of the included articles (Berget and Sandnes, 2015; 2016, Beveridge et al., 2022; Cole et al., 2016; Kvikne and Berget, 2021; MacFarlane, 2010). However, the dominance of only two authors illustrates the scarcity of research on neuropsychiatric disabilities within the larger field of library and information science. The discipline could benefit from a larger number of researchers and perspectives investigating this user groups. As will be shown in the following section, there is also a need for more diversity in the choice of research design.

Research designs and their implications

The studies included in this review predominantly employ experimental research designs. Only five of the 14 studies were conducted in naturalistic settings, and only two of them did not entail the participants completing some kind of set task.

Much of the reviewed research implicitly suggests a medical gaze on disability (see Goodley, 2017). A majority of the studies make use of control groups and interventions, which are standard within medical research. The practice of comparing people with disabilities with a control group of people without disabilities consolidates a binary understanding of ability and disability and highlights differences between people with and without disabilities, rather than their similarities. The main focus is often to compare the reading performances of readers with and without dyslexia, leaving little room for the exploration of the everyday reading practices and the reading experiences of people with dyslexia. Furthermore, three studies make use of the words *normal* and *abnormal* to distinguish between readers with and without neuropsychiatric disabilities (Chen and Keong, 2017; Sidhu and Manzura, 2011; Park et al., 2019), further othering people with disabilities. The traces of medical understandings of disabilities present in much of the reviewed literature suggest that Hill's (2010) call for library and information research theoretically

informed by disability studies has still not been fully answered.

Supporting reading practices

Several studies found that readers both with and without dyslexia were benefited by dyslexia friendly features such as larger text (Chen and Keong, 2017; Rello and Baeza-Yates, 2017), adapted font (Benmarrakchi and El Kafi, 2021) and a higher tolerance for spelling errors (Berget and Sandnes, 2015; 2016; Kvikne and Berget, 2021). These results speak in favour of the application of universal design, which is an approach in designing systems and environments which take into account the diverse needs of all people regardless of disabilities (Berget and MacFarlane, 2020). Nevertheless, the heterogeneity of different readers should not be forgotten. Different users with different impairments may have different needs, as illustrated previously in how Berget and Sandnes' (2015), MacFarlane et al. (2010) and Yechiam and Yom-Tov's (2021) results suggest that readers with dyslexia and readers with autism may have differing preferences in search result presentations. As pointed out by Berget and MacFarlane (2020), universal design, while good in theory, may not always be possible in practice.

The studies in this review offer some suggestions on how online environments can be made more accessible for readers with dyslexia. Suggestions include assistive technologies like larger fonts and screen readers, as well as search engines with higher tolerance for spelling errors. Nevertheless, these features are only small pieces of the puzzle of how to support the reading practices of people with neuropsychiatric disabilities. Only a small number of the studies included in this review (e.g. Barden, 2014; Kvikne and Berget, 2021) actually explore the personal experiences of readers with neuropsychiatric disabilities outside of experimental settings. As noted by Rubery (2022), the voices of readers with neuropsychiatric disabilities are still largely silent in the research. Also, none of the few studies in this review that investigate the readers' experiences address the use of assistive technology to any large extent. In summary, there is still a lack of research about the lived experiences of readers with neuropsychiatric disabilities and their perspectives on how reading can be made more accessible.

Limitations and further research

This study provides an understanding of the reading practices of people with neuropsychiatric disabilities, as described in library and information science research. There are, however, some limitations. No additional databases other than LISA and LISTA were searched. Disabilities and reading have been studied within many different fields of research, such as educational science, psychology and neuroscience (Lundh, 2017; Lundh and Johnson; 2015). It is, therefore, likely that a more extensive search in more subject and cross-disciplinary databases would have generated a greater number of relevant sources. Another limitation of this study is that no citation chaining was used, which could have yielded more relevant studies. Also, only peer reviewed articles published in academic journals were included in the review, i.e. research in other publication formats, such as monographs or reports, was excluded. Therefore, the results of this search should not be interpreted as the sum of all available research on our topic, but merely within the relatively small field of library and information science.

Despite the limitations of this study there are results that stand out as consistent. To conclude, results show that previous research has been undertaken mainly within predefined educational settings, focusing on users' information seeking and information use. Since the field of information practices is a longstanding object of study within library and information science, this might not seem surprising. However, it is also noticeable that reading practices are rarely highlighted or conceptualised as an object of study. This may have implications for how readers with neuropsychiatric disabilities are understood. When reading is studied as an individual, cognitive skill and conceptualised in terms of information seeking and use, other dimensions of reading practices are downplayed. An important task for future reading research is, to a larger extent, to employ a non-evaluative and

methodologically pluralistic approach to readers with neuropsychiatric disabilities and acknowledge how reading is a socially, materially, institutionally, historically, and politically charged practice (see Lundh et al., 2022). There is ample opportunity for library and information researchers to further explore reading practices and disability in order to gain a fuller understanding of reading in all its complexity.

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Appendix I
Search strategies

Database: LISTA via EBSCO
Search 1: neuropsychiatric OR neurodevelopment* OR neurodiver* OR autis* OR "attention deficit disorder" OR "attention deficit hyperactivity disorder" OR asperger OR tourette* OR "reading difficult*" OR "reading disab*" OR "print disab*" OR dyslexi* OR "learning disab*" OR "learning difficult*" OR "language disorder*"

Search 2: "information use*" OR "information usage*" OR "information need*" OR "information seek*" OR "information search*" OR "information behav*" OR "information practice*" OR read*

Search 3: Search 1 and search 2 in combination:
(neuropsychiatric OR neurodevelopment* OR neurodiver* OR autis* OR "attention deficit disorder" OR "attention deficit hyperactivity disorder" OR asperger OR tourette* OR "reading difficult*" OR "reading disab*" OR "print disab*" OR dyslexi* OR "learning disab*" OR "learning difficult*" OR "language disorder*") AND ("information use*" OR "information usage*" OR "information need*" OR "information seek*" OR "information search*" OR "information behav*" OR "information practice*" OR read*)

Database: LISA via ProQuest
Search 1: (noft("reading disab*") OR noft("print disab*") OR noft("learning difficult*") OR noft("learing disab*") OR noft("language disorder*")) OR (noft(neuropsychiatric) OR noft(neurodevelop*) OR noft(neurodiver*) OR noft(autis*) OR noft(tourette*) OR noft("attention deficit disorder") OR noft("attention deficit hyperactivity disorder") OR noft(dyslex*) OR noft("reading difficult*"))

Search 2: noft("information use*") OR noft("information usage*") OR noft("information need*") OR noft("information seek*") OR noft("information search*") OR noft(read*) OR noft("information behav*") OR noft("information practice*")

Search 3: Seach 1 and search 2 in combination:
((noft("reading disab*") OR noft("print disab*") OR noft("learning difficult*") OR noft("learing disab*") OR noft("language disorder*")) OR (noft(neuropsychiatric) OR noft(neurodevelop*) OR noft(neurodiver*) OR noft(autis*) OR noft(tourette*) OR noft("attention deficit disorder") OR noft("attention deficit disorder with hyperactivity") OR noft("attention deficit hyperactivity disorder") OR noft(dyslex*) OR noft("reading difficult*"))) AND (noft("information use*") OR noft("information usage*") OR noft("information need*") OR noft("information seek*") OR noft("information search*") OR noft(read*) OR noft("information behav*") OR noft("information practice*"))

Appendix II

Table of content analysis

Author/-s	Title	Year	Journal	Origin	Impairment	User/-s group and context	Research design	Theme
Barden, O.	Exploring dyslexia, literacies and identities on Facebook	2014	Digital culture and education	United Kingdom	Dyslexia	5 students with dyslexia. Sixth-form college	Naturalistic Qualitative	Reading self-efficacy and identity
Benmarrakchi, F. & El Kafi, J.	Investigating Reading Experience of Dyslexic Children Through Dyslexia-Friendly Online Learning Environment	2021	International Journal of Information and Communication Technology Education	Morocco	Dyslexia	12 children with dyslexia, aged 8-12. 10 boys, 2 girls. Control group: 20 children aged 8-13. 10 boys, 10 girls. 20 Adults, aged 20-26. Female and male. Miscelanious	Experimental Quantitative	Assistive technology
Berget, G. & Sandnes, F. E.	Searching databases without query-building aids: implications for dyslexic users	2015	Information Research	Norway	Dyslexia (ADHD and ADD occur)	20 students with dyslexia and 20 students without dyslexia. Higher education	Experimental Mixed Methods	Reading and information seeking

Authors	Title	Year	Source	Country	Condition	Sample	Method	Topic
Berget, G. & Sandnes, F. E.	Do autocomplete functions reduce the impact of dyslexia on information-searching behavior? The case of Google	2016	Journal of the Association for Information Science and Technology	Norway	Dyslexia (ADHD and ADD occur)	20 students with dyslexia and 20 students without dyslexia. Higher education	Experimental Mixed Methods	Reading and information seeking
Beveridge, L., Makri, S. & MacFarlane, A.	'I'm just not sure.' The persistence of uncertainty in the information seeking of undergraduate students with dyslexia	2022	Information Research	United Kingdom	Dyslexia	20 undergraduate students. All female, aged 18–26. Higher education	Naturalistic Qualititative	Reading self-efficacy and identity
Brunow, D. A. & Cullen, T. A.	Effect of Text-to-Speech and Human Reader on Listening Comprehension for Students with Learning Disabilities	2021	Computers in the Schools	United States	Dyslexia? Reading disabilities? Learning disabilities?	4 students, aged 16-17. High School	Experimental	Assistive technology
Chen, C. & Keong, M.	Affording inclusive dyslexia-friendly online text reading	2017	Universal Access in the Information Society	Malaysia	Dyslexia	Youths aged 14-18. 12 with dyslexia, 12 without. Secondary school	Experimental	Assistive technology

Cole, L., MacFarlane, A. & Buchanan, G.	Does dyslexia present barriers to information literacy in an online environment? A pilot study	2016	Library and Information Research	United Kingdom	Dyslexia	7 students with dyslexia, 7 students without dyslexia. All female, aged 18-27. Higher education	Naturalistic Mixed Methods	Reading self-efficacy and identity
Kvikne, B. & Berget, G.	In search of trustworthy information: a qualitative study of the search behavior of people with dyslexia in Norway	2021	Universal Access in the Information Society	Norway	Dyslexia	Adults with dyslexia, aged 21–58. Male and female, different occupations and education. Miscellaneous	Naturalistic Qualitative	Reading for evaluation and reading and information seeking
MacFarlane, A., Al-Wabil, A., Marshall, C. R., Albrair, A., Jones, S. A. & Zaphiris, P.	The effect of dyslexia on information retrieval	2010	Journal of Documentation	United Kingdom	Dyslexia	5 adults with dyslexia, 5 without. Aged 23-52. Male and female, different occupations and education. Miscellaneous	Experimental	Reading for evaluation

Park, K., Kihl, T., Park, S., Kim, M.-J. & Chang, J.	Fairy tale directed game-based training system for children with ADHD using BCI and motion sensing technologies	2019	Behaviour & Information Technology	South Korea	ADHD	1 boy in first grade, 4 boys in second grade Interviews with parents	Experimental Mixed methods	Assistive technology
Rello, L. & Baeza-Yates, R.	How to present more readable text for people with dyslexia	2017	Universal Access in the Information Society	Spain	Dyslexia	46 participants with dyslexia, 46 without. Spanish speaking, aged 13-43. Miscellaneous	Experimental	Assistive Technology
Sidhu, M. S. & Manzura, E.	An Effective Conceptual Multisensory Multimedia Model to Support Dyslexic Children in Learning	2011	International Journal of Information and Communication Technology Education	Malaysia	Dyslexia	30 children aged 5-12. Educational context.	Experimental	Assistive Technology

| Yechiam, E. & Yom-Tov, E. | Unique Internet Search Strategies of Individuals with Self-Stated Autism: Quantitative Analysis of Search Engine Users' Investigative Behaviors | 2021 | Journal of Medical Internet Research | United States | Self-stated Autism | 1746 users with self-stated autism who conducted searches in Bing in November 2019.

Control group: All users from November -19 who did not state autism.

Miscellaneous | Naturalistic

Quantitative | Reading for evaluation |