doi: 10.18863/pgy.1563018

Readability and Usability of Websites Providing Information on Schizophrenia

Şizofreniye İlişkin Bilgi Sunan Web Sitelerinin Okunabilirliği ve Kullanılabilirliği

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ABSTRACT

Objective: This study was conducted with a descriptive design to evaluate the readability and usability of websites providing information about schizophrenia.

Method: The search was conducted in the Google search engine using the keyword "schizophrenia" in January 2024. Forty-one websites that met the inclusion criteria were included in the study. The readability of the websites was evaluated with the "Ateşman Readability Index" and the usability with the "System Usability Scale."

Results: The source of more than half of the websites (65.9%) was hospitals and similar health institutions. The readability score of the websites was 51.82±6.84, and the education level corresponding to this score is 11-12th grade. The usability score of the websites was 94.63±9.09.

Conclusion: The study results revealed that websites sharing information about schizophrenia are moderately readable and usable. Considering that an increase in the readability level of websites may lead to health inequalities by limiting access to health information and participation in decision-making processes, it is recommended that healthcare professionals pay attention to word count and sentence length in the texts they prepare for websites, avoid the use of medical jargon, and that site administrators design platforms that allow for user feedback.

Keywords: Schizophrenia, website, readability, usability

ÖZ

Amaç: Bu çalışma ile şizofreniye ilişkin bilgi sunan web sitelerinin okunabilirliği ve kullanılabilirliğini değerlendirmek amacıyla tanımlayıcı desende yapılmıştır.

Yöntem: Tarama Google arama motorunda, Ocak 2024 tarihinde "şizofreni" anahtar kelimesi kullanılarak yapılmıştır. Dahil edilme ölçütlerini karşılan 41 web sitesi çalışmaya dahil edilmiştir. Web sitelerinin okunabilirliği "Ateşman Okunabilirlik İndeksi", kullanılabilirliği "Sistem Kullanılabilirlik Ölçeği" ile değerlendirilmiştir.

Bulgular: Web sitelerinin yarıdan fazlasının (%65,9) kaynağı hastane ve benzeri sağlık kuruluşlarıdır. Web sitelerinin okunabilirlik puanı 51,82±6,84 ve bu puana denk gelen eğitim seviyesi 11-12. sınıftır. Web sitelerinin kullanılabilirlik puanı ise 94,63±9,09'dir.

Sonuç: Çalışma sonuçları şizofreniye ilişkin bilgi paylaşımının yapıldığı web sitelerinin orta zorlukta okunabilir ve kullanılabilir olduğunu ortaya koymuştur. Web sitelerinin okunabilirlik seviyelerindeki artışın sağlıkta eşitsizliğe neden olarak sağlık bilgisine ulaşma ve karar alma süreçlerine katılımı sınırladığı düşünüldüğünde sağlık profesyonellerinin web siteleri için hazırladıkları metinlerde sözcük sayına ve cümle uzunluğuna dikkat etmeleri, tıbbi terim kullanımından kaçınmaları, site yöneticilerinin kullanıcı geribildirimlerinin alınabileceği bir tasarım oluşturmaları önerilebilir.

Anahtar sözcükler: Şizofreni, web sitesi, okunabilirlilik, kullanılabilirlik

Introduction

Schizophrenia is a common chronic mental disorder often characterized by deficits in attention, concentration, visual perception, and interpretation (Demirel et al. 2017). While delusions and hallucinations are the most common symptoms, manifestations can vary among individuals (Kumar et al. 2022). Some patients experience improvement over time, while others may face persistent deterioration (Deepak et al. 2024). The unpredictable and complex nature of the disorder makes it challenging not only for affected individuals but also for their families and society to understand and accept (Das et al. 2019). To cope with this, individuals tend to seek information. Although individuals diagnosed with schizophrenia identify healthcare professionals as the most reliable source of information, online resources are frequently preferred due to their accessibility and convenience (Kilit and Eke 2019). This renders the readability and usability of online resources important.

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Received: 07.07.2024 | **Accepted:** 12.12.2024

However, despite their potential benefits, little is known about the nature of health information presented in online resources (Athanasopoulou et al. 2013).

Given the inherently complex and intriguing nature of schizophrenia, along with the need for individuals, families, and society to access comprehensive information about the condition—often through online resources—it becomes crucial to examine websites providing information on schizophrenia. Not only is it important for the source of online information to be well-prepared, but the content must also be understandable to the reader (Basch et al. 2020). This is where the concept of readability, which makes it possible to determine how comprehensible a text is to the reader, comes into play (Ay and Duranoğlu 2020, Visser et al. 2021).

Readability determines the degree of difficulty of the text according to the length of words and sentences in the text and thus can provide information about the suitability of the texts for the target audience (Tahir and Kent 2021). Low readability levels make it difficult for readers to relate to the information and make sense of what they read (Visser et al. 2021). Writing website content in an understandable manner can significantly help individuals, especially those diagnosed with mental disorders, to understand their conditions. It can also encourage them to participate in care and improve their quality of life (Boutemen and Miller 2023). Moreover, it can shift societal misconceptions, contributing to managing risks such as stigma and discrimination (Seki Öz 2021, Ordu 2023). Although limited in number, there is research on the readability of websites on schizophrenia (Kalk and Pothier 2008, Laçiner and Şenol 2023). However, in the rapidly changing dynamic landscape of internet content, providing up-to-date data on the subject not only helps to better understand the existing information but also offers valuable opportunities to evaluate the practical implications of the findings.

The main purpose of establishing a website is to deliver content to the target audience as effectively as possible (Muhammad et al. 2021). As such, websites should be designed by taking into account user characteristics, enabling them to access information without getting lost on the site and without unnecessary steps (Uçak and Çakmak 2009, Baskın 2022). A website's usability level can be expressed by the concept of usability (Muhammad et al. 2021, Minian et al. 2022). Websites with a design that the user can use in the simplest way, easily understand, and respond to user needs in the shortest way have high usability (Dianat et al. 2019). A website with high usability can assist individuals with mental disorders such as schizophrenia, which affects cognitive processes, to easily access the information they are looking for without the need for external help (Bernstein et al. 2022). Also, the uncertainty caused by the disease leads to concerns and distress in families, which may result in difficulties in learning and understanding (Kumar et al. 2022). Websites designed to address these challenges can help users quickly and effectively find the information they seek, allowing them to benefit more from the site content (Baskın 2022). However, to the best of the researchers' knowledge, there is no study evaluating the usability of websites that share information about schizophrenia.

Websites about schizophrenia play a critical role in providing information and raising awareness for individuals diagnosed with schizophrenia, their families, and caregivers (Laçiner and Şenol 2023). Considering these websites are also used as information tools by these individuals, their readability and usability levels become crucial. Complex medical terminologies, inadequate explanations, or non-user-friendly designs may make it difficult for the target audience to access the correct information (Basch et al. 2020, Murtaza et al. 2021). Therefore, the content of these websites must be both easily understandable and accessible. Given this context, this study aims to evaluate the readability and usability of websites that provide information about schizophrenia. The research questions of this study are as follows: (i) Are the websites offering information on schizophrenia readable? (ii) Are they usable?

Methods

Sample

This study is descriptive in design. Globally, the Google search engine is the most commonly used tool for obtaining information, conducting research, and accessing content on various topics (Statcounter 2024). Therefore, this study was conducted using the Turkish keyword "şizofreni" through the Google search engine. It is known that users searching for information online typically do not go beyond the first two pages of search results, which corresponds to approximately 20-40 websites (Cuan-Baltazar et al. 2020). Based on this information, the study examined the first 50 websites retrieved in a search conducted on 06/01/2024.

The inclusion criteria were set as Turkish websites providing information about schizophrenia. The exclusion criteria were that the website had a broken link, contained only video/audio/academic articles/books, was an appointment page, and required a fee or subscription. Thus, nine of the first 50 websites (broken website link

n=1, advertisements n=2, videos n=3, academic articles n=2, appointment page n=1) were excluded, and the study was conducted on 41 websites (N=41).

Procedure

Before conducting the website search to collect data for the study, the session information of the page to be searched was logged out, the location information of the computer was turned off, and the search history was cleared before the website search was performed. The search was made on 06/01/2024 on a single computer. The keyword "şizofreni" (schizophrenia) was typed into the Google search engine in Turkish, and the first 50 websites were analyzed. The texts on the websites that met the inclusion criteria were saved in a Microsoft Word document. To measure the readability level, the text contents were transferred to the online free readability calculation engine, where the Ateşman readability formula was applied. To measure the usability of the websites, SUS was evaluated independently by two researchers, and their results were compared. The agreement between the researchers was determined to be 92%. In cases of disagreement, discussions were held to reach a consensus. All the data obtained were transferred to a Microsoft Excel file, and the analysis process started.

Ethics committee permission and consent were not obtained since the study had no direct effect on humans and/or animals, and the data obtained were open access.

Table 1. Level of readability of websites and corresponding education level

Scores [a]	Readability level [b]	Corresponding Education Level [c]
90-100	Very easy	Students in 4th grade and below
80-89	Easy	5th or 6th grade students
70-79	Easy	7th or 8th grade students
60-69	Intermediate	9th or 10th grade students
50-59	Intermediate	11th or 12th grade students
40-49	Difficult	13th or 15th year (associate degree) students
30-39	Difficult	Bachelor's degree graduates
20 and below	Very difficult	Postgraduate degree graduates

[a, b]: Ateşman Readability Index, [c]: Bezirci Yilmaz readability formula

Data Collection Tools

The data collection tools used in the study were website source, Ateşman Readability Index, and System Usability Scale.

Website Source

Websites that met the research criteria were classified into three groups according to the source of upload: (i) websites created by hospitals and similar health institutions, (ii) websites created by health professionals, (iii) websites created by other sources such as pharmaceutical companies, news pages, online encyclopedias, association pages, and blogs that contain health information.

Ateşman Readability Index

The index was developed by Ateşman (1997) to determine the readability level of websites in the Turkish language (Ateşman 1997). The formula calculated based on word and sentence length is as follows:

'Readability Number = 198,825-40,175xA-2,610xB'
(A: Average word length, B: Average sentence length).

In this study, a freely available online readability calculation engine using the Ateşman readability formula was used to measure the readability level. (http://192.168.1.1/main/fwUpInfoBlock.htm?url=http://okunabilirlikindeksi.com/). The scores that can be obtained from the index vary between 1 and 100. The readability level of the text according to the scores obtained from the index is given in Table 1. However, this index is limited in terms of the educational level at which the texts are readable. To address this, the readability formula developed by Bezirci and Yılmaz, which correlates the obtained scores with the corresponding grade levels in Turkey's education system, has been used (Table 1).

System Usability Scale (SUS)

The scale was developed by Brooke (1996), and the Turkish validity and reliability study was conducted by Kadirkan et al. (2015) (Kadirkan et al. 2015). The scale is used to test different technologies, products, and

interfaces. It consists of 10 items, with odd-numbered items scored positively and even-numbered items scored negatively. Each item is scored between 1 and 5 (1=Strongly Disagree, 5=Strongly Agree). The cutoff score for the scale is 68 points. Scores above this value indicate that the system's usability is above average, while scores below this value suggest that the system's usability is below average. In this study, the Cronbach's Alpha coefficient of the scale is 0.856.

Statistical Analysis

SPSS (Statistical Package for Social Sciences) Windows 26.0 software package (IBM Corp 2023) was used to analyze the collected data. Mean, median, standard deviation, minimum, maximum, and ratio values were used for descriptive data based on readability and usability criteria. Shapiro-Wilk test was used to evaluate the conformity of these values to normal distribution. Percentage calculation was used for data based on website source, readability level, and system usability. A significance level of $p<0.05$ was considered for interpreting the results. Inter-researcher agreement was evaluated using Kappa value (Kılıç 2015).

Table 2: Information on the source, readability, and usability of websites (N=41)

	%(n)	Mean	SD	Median	Min	Max	Shapiro-Wilk	
							Value	p
Website source								
Hospitals and similar health institutions	65.9% (27)							
Health professional	19.5% (8)							
Other +	14.6% (6)							
Readability criteria								
Number of words		1,360.17	1,045.61	1084	270	5970	0.752	0.000*
Number of characters		11,343.68	8,811.52	9018	2264	51394	0.737	0.000*
Number of difficult words		1,346.36	1,033.62	1073	270	5895	0.754	0.000*
Number of short words		197.24	152.49	144	23	818	0.766	0.000*
Number of characters without spaces		9,942.85	7,755.17	7933	1968	45338	0.736	0.000*
Number of sentences		130.14	92.81	99	32	539	0.765	0.000*
Number of paragraphs		56.75	41.41	49	11	224	0.837	0.000*
Average word length		2.99	0.17	3.01	2.8	3.9	0.696	0.000*
Average sentence length		10.46	2.42	10.1	3.2	15.4	0.975	0.502
Ateşman readability index score		51.82	6.84	51.7	37.7	66.3	0.980	0.677
Readability level								
9-10th grade	12.2% (5)							
11-12th grade	43.9% (18)							
13-14th grade	41.5% (17)							
Bachelor's degree graduate	2.4% (1)							
System usability score		94.63	9.09	100	62.50	100.0	0.660	0.000*
System usability								
Usable (<68)	95.1% (39)							
Not usable (68<)	4.9% (2)							

*p<0.05

Results

When examining the websites that met the research criteria according to the source of the upload, it was found that 65.9% were uploaded by hospitals and similar healthcare institutions, 19.5% by healthcare professionals, and 14.6% by other sources such as pharmaceutical companies, news sites, online encyclopedias, association pages, and blogs (Table 2).

The average word count of the text on the web pages was 1,360.171 ± 1,045.616, with an average of 1,346.366 ± 1.033 difficult words, 130.146 ± 92.814 sentences, 56.756 ± 41.415 paragraphs, and an average sentence length of 10.467 ± 2.422. The average score for the websites' text based on the Ateşman Readability Index was 51.827 ± 6.84. According to readability scores, 56.09% of the texts are at an intermediate level, while 43.90%

are at a difficult-to-read level. Additionally, when the readability levels were examined by grade level, 43.9% of the texts corresponded to the 11-12th grade education level (Table 2).

The average usability score for the websites included in the study was 94.634 ± 9.09. Only 4.9% of these websites had a usability score below the cutoff and were considered unusable (Table 2).

Discussion

The primary purpose of websites is to meet the information needs of their targeted user group. However, having rich content alone is not sufficient. It is also crucial that users can easily access the information they are seeking and that the information is presented in an understandable manner (Basch et al. 2020, Farid et al. 2022). This study evaluated the readability and usability of online information on schizophrenia. The results of the study indicate that more than half of the texts on the websites were uploaded by hospitals and similar healthcare institutions, the readability of the websites corresponds to an intermediate difficulty level appropriate for the 11-12th grade education level, and their usability is above average.

Easy access to online environments has made these resources the most popular source for obtaining health information (Szmuda et al. 2020). This raises the question of who is providing this information. In response to this question, the source of the websites was examined in this study, and it was found that more than half were from hospitals and similar healthcare institutions. A similar study examining websites sharing information about schizophrenia also reached comparable results, reporting that the majority of the sources of information were hospitals (Laçiner and Şenol 2023). These results are promising because, in cases like schizophrenia, which is often misunderstood by society and surrounded by numerous myths (Bilgen et al. 2020, Peşkirci and Uslu 2022), reducing negative perceptions can only be achieved through the dissemination of accurate information and the education of patients and their families. Furthermore, since these websites are used by individuals with schizophrenia and their relatives (Ekinci and Koyuncu 2024), having content created by professionals may help alleviate concerns about the reliability of the information.

It has been reported that users quickly skim through websites and read at most 28% of the words when visiting any website (Weinreich et al. 2008). Additionally, individuals with limited literacy skills often search for specific information online and spend only 15 seconds or less on a website. As a result, using long, complex words and sentences can lead users to skip over the text, causing their attention to drift (Basch et al. 2020). This issue becomes even more critical when the individuals using the website are those diagnosed with schizophrenia because these individuals may experience difficulties in cognitive functions such as attention, memory, and problem-solving due to the nature of the condition and may easily abandon reading when faced with complex word structures (McCutcheon et al. 2020). (McCutcheon et al. 2020). The average word length in Turkish is 2.6 syllables, and the average sentence length is 9-10 words (Ateşman 1997). The syllable and word counts of the texts analyzed in this study align with this information. Since it is well-established that an increase in the average word and sentence length decreases readability (Tahir and Kent 2021), it can be said that the websites analyzed in this study are in a more advantageous position in terms of comprehensibility. Given the supportive role of reliable and comprehensible health information in coping with schizophrenia and ensuring treatment adherence (Deepak et al. 2024), such information may encourage these individuals to take a more informed and active role in managing their condition. However, it should be noted that difficulties in understanding the information provided by the website may cause health inequalities and limit access to health information and participation in decision-making processes (Moccia et al. 2016). Still, it is crucial to recognize that the readability of a text does not necessarily reflect the reliability of the information it contains. For this reason, planning studies that evaluate the reliability as well as readability of information may contribute to the field and website users.

Health information provided in online environments relies on self-directed learning (Farid et al. 2022). In self-directed learning, even though the individuals have searched for the information they want, their learning may not be optimal if the texts that come up as a result of the search are not at a readability level suitable for the target audience (Basch et al. 2020, Murtaza et al. 2021). Therefore, for health information presented online to be easily readable and understandable by a broad audience, it is desirable for these texts to have a low readability level (Felipe et al. 2020, Boutemen and Miller 2023). Unfortunately, however, Turkish (Laçiner and Şenol 2023) and English (Kalk and Pothier 2008) studies on website texts that provide information about schizophrenia have shown that the texts are at a difficult readability level. This may cause individuals diagnosed with schizophrenia and their families to have difficulty understanding the information provided on websites (Laçiner and Şenol 2023). In the present study, the readability levels of the texts were found to be moderately difficult. While this

level is relatively more acceptable compared to similar studies (Kalk and Pothier 2008, Laçiner and Şenol 2023), it still poses a risk considering the cognitive challenges faced by individuals with schizophrenia.

Tools that measure readability not only provide insights into the readability levels of texts offering health information but also indicate the educational level required to comprehend these texts. In the United States, the average adult reading level is equivalent to that of a 13- to 14-year-old child (Basch et al. 2020). Based on this, the American Medical Association recommends that health/disease-related information should not exceed a reading level corresponding to an 11- or 12-year-old child, equivalent to a 6th-grade reading level or lower (Szmuda et al. 2020). Considering the Turkish Statistical Institute's report indicating that the average length of schooling in Turkey is 9.3 years (TÜİK 2023), the readability grade level of health information is expected to align with this. As a matter of fact, studies have suggested that a text containing medical information should be prepared at or below the 6th-grade readability level in order to be readable (Eryılmaz and Külahçı 2019, Tahir and Kent 2021). However, studies have shown that the reading difficulty of texts containing health information about schizophrenia in an online environment is much higher than recommended (Kalk and Pothier 2008, Laçiner and Şenol 2023). Similarly, this study found that the readability level of schizophrenia-related information on websites was far above the recommended level, equivalent to the 11th-12th grade. It is particularly important for texts providing information about schizophrenia to adhere to the recommended reading level. This is because individuals with this condition often experience cognitive impairments such as attention, perception, and learning difficulties, which add an additional layer of challenge when reading about their illness (McCutcheon et al. 2020, Seki Öz 2021). Moreover, the inherently complex nature of health information and the use of medical terminology further reduce readability for all segments of society (Boutemen et al. 2023).

Readability formulas are calculated based on the length of words and sentences in texts. To improve comprehensibility, it is recommended to keep word and sentence lengths short and to avoid the use of medical terminology. Based on the findings of this study, it is advised that websites providing health information, especially on mental disorders like schizophrenia, update their content considering linguistic variables that influence readability, given that such websites are also used as an information source by individuals diagnosed with schizophrenia (Ekinci and Koyuncu 2024). Even if it is ensured that the readability levels of websites are easily understandable by all users, it should not be overlooked that the reliability of information should be questioned and researched.

Usability is defined as the degree to which users can use a product effectively, efficiently, and satisfactorily to achieve specific goals (Farid et al. 2022). In the context of websites, usability implies that the design of a website should be easy to use and understand (Muhammad et al. 2021). In websites with high website usability, users can navigate easily within the site and access the information they want easily and quickly (Baskın 2022). Conversely, low usability can harm a website's overall credibility, negatively impacting users' trust in the information presented (Muhammad et al. 2021). In this study, the websites were found to have usability levels above average. To the best of the researchers' knowledge, there is no direct study evaluating the usability of websites that provide information about schizophrenia, but there are studies on websites containing health information. Although some findings align with the results of this study (Minian et al. 2022, Otu and Karagözoğlu 2022), some research results suggest that website usability remains insufficient (Cajita et al. 2017, Bernstein et al. 2022). Studies emphasize the importance of understanding the target audience and meeting their needs and expectations for successful website design (Cajita et al. 2017, Bernstein et al. 2022, Minian et al. 2022, Otu and Karagözoğlu 2022). Websites providing information about schizophrenia should be designed to convey information more effectively to their target audience (e.g. patients and families). This makes it essential to make these websites more accessible and user-friendly (Bernstein et al. 2022). User-friendly designs play a critical role in enabling individuals to access accurate and fast information, especially on platforms that provide complex and attention-demanding health information, such as schizophrenia (McCutcheon et al. 2020). To this end, website design should prioritize accessibility and visual simplicity, considering the cognitive and perceptual needs of users. Furthermore, incorporating mechanisms to collect user feedback during the design process could enhance the usability and functionality of these websites.

This study has some strengths and limitations. The usability of websites containing the term "schizophrenia" has been evaluated for the first time, to the best of the researchers' knowledge. This is a strength of the study. On the other hand, the study has some limitations. Online environments have dynamic content. This means that the data referred represents the period in which the study was conducted, and it should be taken into consideration that the results may vary in future searches conducted at different times. In addition, the fact that a single language (Turkish) was selected for the term used in the search is one of the limitations of this study. The readability level may vary in searches conducted in other languages.

Conclusion

The results of this study reveal that more than half of the texts on websites providing information about schizophrenia originate from hospitals and similar healthcare institutions. The readability of these websites corresponds to an intermediate difficulty level, equivalent to 11-12th grade education, and their usability is above average. Based on these results, it is recommended that content creators, particularly healthcare professionals, pay attention to the number of words and sentence length in their texts, avoid using medical jargon, create designs that allow user feedback, and regularly update the content of the websites. Given the dynamic nature of online environments, it may be necessary to periodically repeat studies on this topic. It is also recommended that studies be planned that evaluate the readability of texts in online environments, the usability of the website, and the reliability of information.

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Authors Contributions: The author(s) have declared that they have made a significant scientific contribution to the study and have assisted in the preparation or revision of the manuscript

Peer-review: Externally peer-reviewed.

Conflict of Interest: No conflict of interest was declared.

Financial Disclosure: No financial support was declared for this study.