



## ORIGINALES

### Assessment of an Assistive technology on drugs: comparative study between Brazil and Portugal

Avaliação de tecnologia assistiva sobre drogas: estudo comparativo entre Brasil e Portugal

Evaluación de una tecnología de asistencia en drogas: estudio comparativo entre Brasil y Portugal

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#### ABSTRACT:

**Purpose:** (1) To evaluate the appropriateness of the assistive technology "Drugs: Reflection for Prevention" in regarding its "objectives", "accessibility", "clarity", "structure and presentation", "relevance and effectiveness", and "interactivity" from the perspective of visually impaired people in Brazil and Portugal, and (2) to compare the evaluations of participants in Brazil and Portugal.

**Method:** Descriptive and exploratory study carried out in associations for visually impaired people. Sixty-two visually impaired people participated in the study. Data were collected through an Assistive Technology Assessment Questionnaire. Data were described through means to analyze the attributes and the Mann-Whitney test was used to verify the association between results in the two study sites.

**Results:** In Brazil, the participants were predominantly male, blind, with 14.81 years of schooling; and in Portugal the participants were predominantly female, blind, with 9.58 years of schooling. The participants' evaluation of the Assistive Technology was good at both countries, with a mean score above 1.6. There were no differences between countries ( $p > 0.05$ ) in the evaluation.

**Conclusions:** Assistive Technology on psychoactive substances received a good evaluation in Brazil and Portugal. The differences between the participants of the two countries did not interfere with the evaluation.

**Keywords:** Self-help devices; Disorders related to substance use; Health education; People with visual impairment.

## RESUMO:

**Objetivos:** (1) Avaliar a adequação da Tecnologia assistiva “Drogas: reflexão para prevenção” em relação aos seus “objetivos”, “acessibilidade”, “clareza”, “estrutura e apresentação”, “relevância e eficácia”, e “interatividade” na perspectiva de pessoas com deficiência visual no Brasil e em Portugal, e (2) comparar as avaliações dos participantes no Brasil e em Portugal.

**Método:** Estudo descritivo e exploratório desenvolvido em associações para pessoas com deficiência visual. Sessenta e duas pessoas com deficiência visual participaram do estudo. Os dados foram coletados por meio do Questionário de Avaliação de Tecnologia Assistiva. Os dados foram descritos em média para análise dos atributos e o teste de Mann-Whitney foi usado para verificar a associação entre os resultados nos dois locais de estudo.

**Resultados:** No Brasil, os participantes eram predominantemente homens, cegos, com 14,81 anos de estudo; e em Portugal os participantes eram predominantemente mulheres, cegas, com 9,58 anos de estudo. A avaliação da Tecnologia Assistiva pelos participantes foi boa em ambos os países, com uma média acima de 1,6. Não houve diferenças na avaliação entre os dois países ( $p > 0,05$ ).

**Conclusões:** A tecnologia assistiva sobre substâncias psicoativas recebeu uma boa avaliação no Brasil e em Portugal. As diferenças entre os participantes dos dois países não interferiu com a avaliação.

**Palavras-chave:** Equipamentos de autoajuda; Transtornos relacionados ao uso de substâncias; Educação em Saúde; Pessoas com deficiência visual.

## RESUMEN:

**Objetivos:** (1) Evaluar la idoneidad de la tecnología asistencial "Medicamentos: reflexión para la prevención" en cuanto a sus "objetivos", "accesibilidad", "claridad", "estructura y presentación", "relevancia y eficacia" e "interactividad" desde la perspectiva de las personas con discapacidad visual en Brasil y Portugal, y (2) comparar las evaluaciones de los participantes en Brasil y Portugal.

**Método:** Estudio descriptivo y exploratorio desarrollado en asociaciones para personas con discapacidad visual. Participaron en el estudio sesenta y dos personas con discapacidad visual. Los datos se recopilaron a través de un Cuestionario de evaluación de tecnología de asistencia. Los datos se describieron mediante medios para analizar los atributos y se utilizó la prueba de Mann-Whitney para verificar la asociación entre los resultados en los dos sitios de estudio.

**Resultados:** En Brasil, los participantes fueron predominantemente hombres, ciegos, con 14,81 años de escolaridad; y en Portugal los participantes eran predominantemente mujeres, ciegas, con 9,58 años de escolaridad. La evaluación de los participantes de la tecnología de asistencia fue buena en ambos países, con una puntuación media superior a 1,6. No hubo diferencias entre países ( $p > 0.05$ ) en la evaluación.

**Conclusiones:** La tecnología de asistencia sobre sustancias psicoactivas recibió una buena evaluación en Brasil y Portugal. Las diferencias entre los participantes de los dos países no interfirieron con la evaluación.

**Palabras clave:** Dispositivos de autoayuda; Trastornos relacionados con sustancias; Educación en Salud; Personas con daño visual

## INTRODUCTION

Substance abuse is a public health problem in Brazil and Portugal<sup>(1,2)</sup>. Responses focused on prevention strategies have shown to be as important as treatment and rehabilitation in Brazil<sup>(3)</sup>. Additionally, strategies such as health education and counselling often have lower costs than treatment and rehabilitation in hospitals, centers of psycho social care, and therapeutic communities. Such prevention strategies, however, frequently exclude individuals with disabilities that need affordable and accessible resources to deal with substance abuse.

Published research about substance abuse among people with disabilities is scarce. A nationwide survey in the United States with adults affirmed that the use of illicit drugs is a potentially serious problem among people with disabilities that require research and clinical care<sup>(4)</sup>. Another study conducted with intellectually disabled people in the

Netherlands found that substance abuse is considered a problem in this group. It was related to anxiety, depression, aggressive behavior, antisocial personality disorder, and hyperactivity<sup>(5)</sup>.

A study about illicit drug use by people with disabilities, who were active clients of state vocational rehabilitation services in Ohio, Michigan, and Illinois, found that marijuana was the most commonly used drug among participants. The authors described younger age, male sex, low income, presence of family or friends who use illicit drugs, greater feelings of hostility and risk-taking behaviours, and lower self-esteem are factors that influence illicit drug use by disabled people<sup>(6)</sup>. These factors identified as risks for drug use are similar among people without disabilities in family health unit, in which the consumption of alcohol is associated with male sex, single status, young age (between 18 and 30 years), and non-practice of religion<sup>(7)</sup>.

Taggart, McLaughlin, Quinn, and McFarlane<sup>(8)</sup> found that the reasons for substance abuse by people with intellectual disabilities are self-medication, psychological trauma, social distance from their community, loss, sadness, and confusion.

Although people with disabilities show a high consumption of psychoactive substances, treatment and rehabilitation services are scarce. Authors described some barriers to substance abuse treatment among people with disabilities who participated in their study (visual impairment, spinal cord, injury, mental illness, cerebral palsy, speech impairment, arthritis, and neuropathy), including the lack of desire to be treated, the poor quality and inaccessibility of treatment programs, little family support, lack of transportation, lack of physical accessibility to treatment, unavailability of accessible equipment/ materials for people with sensory impairments, the belief that the stigma of disability impedes treatment success<sup>(9)</sup>. In another study, the lack of services and physical accommodations for people with sensory limitations such as visual and audio alerts in elevators and material in Braille were identified as barriers in the substance abuse treatment facilities in the United States<sup>(10)</sup>.

As seen above, specific research on prevention of substance abuse among people with visual impairments is rare. It is important to create strategies, methodologies, and assistive technologies with the goal of informing people with visual impairment on psychoactive substances.

Assistive technologies are seen as a field of knowledge with interdisciplinary characteristics encompassing products, resources, methodologies, strategies, practices, and services that aim to promote the functionality and participation of people with disabilities, including the promotion of their autonomy, independence, better quality of life and social inclusion<sup>(11-13)</sup>.

Various assistive technologies have been developed to expand access to health information for visually impaired people. An assistive technology for this group is the verbalization of written texts using a computer voice synthesizer. The computer voice synthesizer software can also be used by people without visual impairment. There are many versions of this software, some of which are to be purchased while others are free, as the one used in the present study.

Assistive technology has been used to disseminate health promotion information related to breastfeeding in Brazil. Information commonly accessed through “cordel”

literature (i.e., booklets of the popular culture of Brazil) was made available in the form of poem through a computer voice synthesizer. The verses mentioned the composition of breast milk, positioning of the infant in the mother's breast, and family support, among others. This assistive technology was considered attractive and effective by visually impaired people<sup>(14)</sup>.

In a second example, a text-to-speech synthesizer was designed to assist visually impaired women to learn how to use the female condom. In this case, the informative text was supplemented by an anatomical model that simulated the vaginal canal to enable blind women to better understand how to use the device. Visually impaired people could follow the written description using the computer voice synthesizer. This assistive technology was considered appropriate for blind women with respect to its objectives, relevance, structure, and presentation<sup>(15)</sup>.

Based on the success of the above mentioned assistive technology strategies in other areas of health promotion, it was developed an accessible technological resource focused on health information about prevention of substance abuse. The technological resource is titled "*Drugs: Reflection for Prevention*" and was designed to be used in Brazil by visually impaired people with the aid of computer voice synthesizers. The technological resource was developed with references from articles and material provided by the Brazilian Ministry of Health. Its content included the common types of drugs, the physical, psychological and social effects of substance abuse, and the strategies to prevent their use<sup>(16)</sup>.

The technological resource "*Drugs: Reflection for Prevention*" was written to attend people with visual impairment' necessities. The technological resource can be read by people with and without disability. Thus, we consider it as an assistive technology. The technological resource is different from other educational materials on psychoactive substance because it was elaborate especially for people with visual impairment and it was converted into a file accessible to the computer voice synthesizer. Furthermore, the assistive technology was evaluated by blind people. The participants' study considered the text informative, satisfactory and reached its objective<sup>(16)</sup>.

In this light, the objectives for this study were (1) to evaluate the appropriateness of the assistive technology "*Drugs: Reflection for Prevention*" in regarding its "objectives", "accessibility", "clarity", "structure and presentation", "relevance and effectiveness", and "interactivity" from the perspective of visually impaired people in Brazil and Portugal, and (2) to compare the evaluations of participants in Brazil and Portugal.

## **MATERIALS AND METHODS**

### **Study design**

This was a descriptive and exploratory study with quantitative approach. These methods were chosen because they meet the objectives of study.

### **Study site**

The study was conducted in association for the visually impaired in Brazil and in Portugal. In Brazil, the associations are located in the states of Paraíba, Pernambuco,

Piauí, Rio Grande do Norte and Ceará. In Portugal, the study was developed in associations that were located in the city of Porto. In Brazil, each institution had about 120 users, and in Porto, the associations had about 500 users. These associations in both countries offer social and recreational activities such as sports, music, computer courses, training for activities of daily life, and others. Health services are not offered by the institutions in any of the countries.

### Study population

The study population consisted of people with visual impairment, whether blindness or low vision. Blindness is understood here as visual acuity equal to or below 0.05 in the better eye, while low vision corresponds to visual acuity between 0.3 and 0.05 in the better eye, with the best optical correction<sup>(17)</sup>.

Eligibility criteria were age of 18 years and over. Individuals with multiple disabilities were excluded. Researchers used convenience sampling, by inviting those present in the study sites to participate in the study. Thus, 31 participants were enrolled in Brazil and 31 in Portugal.

### Data collection

An instrument for evaluation of the Assistive Technology was used for data collection. The Assistive Technology Assessment Questionnaire was developed and validated by the authors. The Cronbach's alpha of the instrument was 0.822<sup>(18)</sup>. This instrument was chosen because it was create to evaluated health educative assistive technologies. It consists of 18 items assessing six attributes: objectives, accessibility, clarity, structure and presentation, relevance and effectiveness, and interactivity. The participants scored each item in a three-point Likert-type scale to judge it as inadequate, partially adequate, adequate assigning scores of 0, 1, or 2, respectively. The attributes are defined below.

The attribute **objectives** indicate whether the Assistive Technology achieved its purposes and goals, in other words, if the Assistive Technology informs about psychoactive substances. **Accessibility** consists of the ease to access the AT by the participant. **Clarity** indicates whether the information provided by the AT is clear to the participant. **Structure and presentation** of the content refers to the way the information is presented, including its overall organization, structure, presentation strategy, consistency, and formatting. **Relevance and efficacy** is related to the significance of the educational material presented, whether it is relevant to user or not. **Interactivity** is related to involvement of the participant in the educational process.

In Portugal, the assistive technology was adapted for the Portuguese context by teachers with expertise in the area of substance abuse and therapeutic information. The teachers read the text and suggested the modification of two terms that are used in Brazil, but not in Portugal, namely, "*maconha*" and "*cigarro*", changed to "*marijuana*" and "*tabaco*".

Following our process of developing evidence-informed and culturally-relevant texts, the next important step was to evaluate the user's perceptions about objectives, clarity, structure and presentation of the text. This evaluation step is crucial for

ensuring the appropriateness of the assistive technology about substance abuse and for the widespread application of the information in the region.

In a second moment, visually impaired people read the text "*Drugs: Reflection for Prevention*" using a computer voice synthesizer and afterwards, the participants answered the Assistive Technology Assessment Questionnaire. This process lasted about 20 minutes. This procedure was done one-on-one in both countries.

### **Data analysis**

Data were analyzed with the aid of the statistical software SPSS version 19. A confidence level of 95% was adopted. We used means to analyze the attributes and the Kruskal Wallis test to verify the association between the results in the two study sites. For each attribute, the mean was calculated and compared between countries. We considered an attributed inadequate when the mean was equal to 0; partially adequate when the mean was between 0.1 and one and adequate when the mean was between 1.1 and 2.

### **Ethical considerations**

In Brazil, the study was approved by the Research Ethics Committee of the Federal University of Pernambuco, under approval protocol nº 928.694. In Portugal, the senior leaders of the institutions analyzed the scientific and ethical aspects of the project and gave permission for its implementation. The participants received an informed consent term and after comprehension of the study objectives and acceptance to participate, they were enrolled in the research.

## **RESULTS**

### **Characteristics of participants**

The study included 62 people equally distributed between Brazil and Portugal. In Portugal, blind (67.7%) people and people with low vision (32.3%) participated, while in Brazil all participants were blind. The mean age was 34.94 years in Brazil, and 51.48 years in Portugal. As for sex, the sample in Brazil was 54.8% male, and in Portugal was 51.6% female. In Brazil, the average education was 14.81 years of schooling and in Portugal 9.58 years.

### **Evaluation of the assistive technology text "Drugs: reflection for prevention"**

With regard to the evaluation process of the Assistive Technology, table 1 shows the evaluation in both countries.



**Table 1-** Evaluation of attributes of the Assistive Technology in Brazil and Portugal, 2014.

Attributes	Items	Brazil						Portugal					
		Inadequate		Partially		Adequate		Inadequate		Partially		Adequate	
		N	%	N	%	N	%	N	%	N	%	N	%
Objectives	Relates the addressed content in your daily life	0	0	6	19.4	25	80.6	3	9.7	8	25.8	20	64.5
	Solve doubts about the addressed content	0	0	2	6.5	29	93.5	0	0	4	12.9	27	87.1
	Stimulates learning about the addressed content	0	0	4	12.9	27	87.1	0	0	3	9.7	28	90.3
Accessibility	Stimulates learning of new concepts or facts	0	0	1	3.2	30	96.8	2	6.5	3	9.7	26	83.9
	Allows to search for information without difficulties	1	3.2	8	25.8	22	71.0	0	0	9	29.0	22	71.0
	Offers adequate and needed resources for its use	0	0	13	41.9	18	58.1	2	6.5	5	16.1	24	77.4
Clarity	Presents necessary information for better comprehension of content	0	0	6	19.4	25	80.6	0	0	2	6.5	29	93.5
	Information content is adequate to its needs	1	3.2	4	12.9	26	83.9	4	12.9	5	16.1	22	71.0
	Presents information in a simple manner	1	3.2	3	9.7	27	87.1	0	0	4	12.9	27	87.1
Structure and presentation	Presents content in an organized manner	0	0	3	9.7	28	90.3	0	0	2	6.5	29	93.5
	It has an attractive presentation strategy	2	6.5	6	19.4	23	74.2	1	3.2	5	16.1	25	80.6
Relevance and efficacy	Allows reflection on the presented content	0	0	5	16.1	26	83.9	1	3.2	4	12.9	26	83.9
	Arouses interest to use it	6	19.4	5	16.1	20	64.5	2	6.5	5	16.1	24	77.4

Interactivity	Stimulates your behavior change	4	12.9	7	22.6	20	64.5	5	16.1	9	29	17	54.8
	Reproduces content addressed in different contexts	0	0	6	19.4	25	80.6	2	6.5	5	16.1	24	77.4
	Offers interaction, active involvement on the educational process	1	3.2	2	6.5	28	90.3	1	3.2	6	19.4	24	77.4
	Allows navigation without difficulties through the presented links	1	3.2	13	41.9	17	54.8	1	3.2	5	16.1	25	80.6
	Provides autonomy to user in relation to its operation	0	0	11	35.5	20	64.5	1	3.2	4	12.9	26	83.90

With regard to the evaluation process of the Assistive Technology, the average of the attributes is shown in Table 2.

**Table 2** - Evaluation of attributes of the Assistive Technology in Brazil and Portugal, 2014.

Country		Objectives	Accessibility	Clarity	Structure	Relevance	Interactivity
Brazil	Mean	1.89	1.62	1.81	1.79	1.65	1.67
	Median	2.00	2.00	2.00	2.00	1.75	1.67
Portugal	Mean	1.77	1.71	1.79	1.85	1.65	1.77
	Median	1.75	2.00	2.00	2.00	1.75	2.00

The highest scores were obtained in the attribute objectives in Brazil, and structure and presentation in Portugal. The attribute that received the lowest mean score was accessibility in Brazil, and relevance and effectiveness in Portugal.

There were no statistically significant differences between the mean scores of the attributes in Brazil ( $p = 0.121$ ) and Portugal ( $p = 0.092$ ), that is, there were no differences between countries in the evaluation of attributes, as shown in Table 3.

**Table 3** – Comparison between evaluation in Brazil and Portugal, 2014.

Country	p value <sup>a</sup>
Brazil	0.121
Portugal	0.092

<sup>a</sup> Kruskal Wallis Test

No statistically significant difference between Brazil and Portugal ( $p > 0.05$ ) was observed when the mean score of the six attributes combined (objectives,



accessibility, clarity, structure and presentation, relevance and efficacy and interactive).

## DISCUSSION

Access to health information should be available to all individuals regardless of ability. This is important, because Brazil and Portugal ratified the protocol of the Convention on the Rights of Persons with Disabilities. This document reaffirmed the universal principles of dignity, integrity, equality and non-discrimination and aims to promote other appropriate assistance strategies to help people with disabilities and guarantee their access to information<sup>(19)</sup>. In Brazil, Law 10.098 published in 2000 aimed to improve the accessibility for people with disabilities, especially with respect to building constructions, transportation and communication<sup>(20)</sup>. Portugal has a similar law, number 163, published in 2006<sup>(21)</sup>. Although the Law guarantees access, it is necessary to make sure that people with disabilities are actually included, in this case, the visually impaired<sup>(22)</sup>. Educational materials should be accessible to people, according to their particularities. It is, therefore, important that the accessibility of these materials be evaluated by people with disabilities. In this context, there is not studies like this, what difficult the comparisons of the results.

With respect to the age of the study participants, the participants in Portugal were older than in Brazil. In the latter country, attention is guaranteed because, according to the 2010 census in Brazil, people with visual disabilities were in the age group above 65 years<sup>(23)</sup>. The finding of this study also agreed with other study that found participants in Portugal to be older than those in Brazil<sup>(24)</sup>.

The differences in age and educational level between Brazilian and Portuguese participants did not affect the results. Based on the range of educational backgrounds of the participants, we can say that the simple language used was clear for a wide range of different educational abilities, and understandable for people with fewer years of schooling and still appealing for those with higher literacy<sup>(25)</sup>. We need to note that the relation between the understanding of information and acquisition of knowledge with the different literacy levels was not explored in the participants of our study.

With regard to the text on psychoactive substances, the assessment of visually impaired people in Brazil and Portugal on accessibility was similar, despite the cultural differences between the two countries.

Based on the results found, the adaptation process used in the present study was similar to a previous study that adapted Assistive Technology on breastfeeding in “cordel” literature for visually impaired people in Portugal. The AT was considered an important health promotion strategy<sup>(26)</sup>.

In the present study, the attribute “objectives” had the highest mean score in Brazil. This attribute indicates that the AT provides information on substance abuse. This result is similar to a study that evaluated an Assistive Technology with an educational text about sexually transmitted infections designed for women with visual disabilities. The study concluded that the Assistive Technology contributed to the learning and autonomy of women<sup>(27)</sup>. Also, similar results have been found in study that evaluated an Assistive Technology about psychoactive substances in the form of a game for

people with visual impairment. This AT allowed the public to access information on psychoactive substances in an accessibility and playful manner<sup>(28)</sup>.

On the other hand, in Portugal the attribute “structure and presentation” had the highest mean score. This result indicates that the Portuguese participants considered the AT organized, clear and consistent.

In both countries, the attributes “clarity”, “structure and presentation” and “relevance” received similar evaluations. These results are important. As Oliveira, Carvalho, Pagliuca<sup>(26)</sup> explained, an educational technology that aims health promotion must be adapted to the cultural reality of the target public and it must convey the information in a clear manner. These results also corroborate with other authors who affirmed that in order to elaborate educational materials, it is important to verify the clarity and relevance of the text<sup>(29)</sup>.

The attribute that received the lowest score was “accessibility” in Brazil, and “relevance and efficacy” in Portugal. These results are related to use the computer voice synthesizer and the information on psychoactive substance. In Brazil, during the data collected, we noticed that the participants do not make use of computer voice synthesizers with high frequency. They told us about some difficulties to use the computer voice synthesizers, like lack of ability to use computer and software. Also, in Portugal, we noticed the participants did not consider the Assistive Technology relevant because, there is too much information on psychoactive substances.

In general, the scores in all attributes in Brazil and Portugal were above 1.6. This means that the attributes were evaluated as adequate by the participants, and shows that the Assistive Technology can be used as a healthcare instrument to inform on substance abuse.

One of the limitations of the study was that we did not assess knowledge acquisition. In another study, we evaluated the information acquired<sup>(30)</sup>. Another limitation was the number of participants obtained through convenience sampling in associations for the visually impaired. Further studies including a higher number of visually impaired people from different organizations are encouraged.

We recommend that other assistive technologies on psychoactive substances must be created to inform people with disabilities about this important topic.

## CONCLUSIONS

In the study, we found that the Assistive Technology "*Drugs: Reflection for Prevention*" was assessed with high scores in Portugal and Brazil. All the attributes evaluated by visually impaired people in Brazil and Portugal received scores varying between 1.65 and 1.89. Thus, the results suggest that the text "*Drugs: Reflection for Prevention*" on psychoactive substances in conjunction with a computer voice synthesizer is suitable for use by visually impaired people in both countries. It was evident that cultural differences in the two scenarios of the study did not influence the assessment.

The AT "*Drugs: Reflection for Prevention*" reached the purposes for which it was developed. It was accessible to visually impaired people, clear, had an attractive

structure and presentation and provided autonomy to its users. Given the success of this text and the use of the computer voice synthesizer, other health education topics could be developed to be used in a similar way as assistive technologies for people with visual impairment.

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