**Article**

# The role of digital media and digital literacy in non-formal health education

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**Abstract**
Digital health literacy involves the individual's ability to effectively interpret, evaluate and use health information obtained through digital media, enabling them to make decisions and have greater autonomy over their health. Considering the increasing use of digital media as a source of health information for the population, the present study aimed to evaluate the digital health literacy level of individuals who use social media. The study was conducted with a sample of 423 individuals using a digital questionnaire to obtain socioeconomic data, and the eHealth literacy scale (eHeals) instrument was used to assess the level of digital health literacy. The results indicated that higher levels of education and income correlate with higher levels of digital health literacy. The biological determinants of age and gender did not correlate with digital literacy. It is concluded that government strategies that seek to use social media such as Facebook, Instagram and Twiter as an alternative to non-formal health education should consider that the success of these strategies depends on first investing in the formal education of the population.

**Keywords**: Non-formal education, Health education, Health policy.

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## 1. Introduction

The reciprocal relationship between education and health is based on evidence that an individual's level of education is related to their health outcomes in adulthood. In the same perspective, healthier children are more likely to be more academically outstanding than those who have health problems (BIRCH, 2017). Based on this premise, public policies that strengthen programs and strategies aimed at health education are important for improving the quality of life of the population (TENGLAND, 2016).

Considering such needs, in Brazil, education and health policies have been implemented and reformulated. Among them, it is worth noting that the Ministry of Health (MS), through ordinance No. 589, of May 20, 2015, instituted the National Policy for Health Information and Informatics (PNIIS) (MS, 2015). Among the guidelines of this policy, we draw attention to the stimulation to use information and communication technologies (ICT) to improve the population's access to health services (MOREIRA; PINHEIRO, 2015).

Due to the population's increased access to digital media, especially after the emergence of online social networks, studies on health education strategies in non-formal environments have been increasingly frequent (GABARRON et al., 2018; HSU et al., 2018; LaBARGE; BROOM, 2019). In Brazil, about 62% of the population uses online social networks (DINO, 2018), suggesting a potential to use this tool as a non-formal health education strategy.

Therefore, the MS created a page on Facebook, and an account on Instagram and Twiter, in order to disseminate health information and dialogue with the population (MOREIRA; PINHEIRO, 2015). Although, so far, there are no scientific records about the effects of this initiative, it is expected that the expansion of access to health information will subsidize the improvement of the population's health.

However, in the face of the growing spread of so-called fake news, coupled with conspiracy theories and bots (robots) that help to disseminate and viralize such content (VOSOUGHI et al., 2018), efforts need to be made to direct the use of digital media in health education strategies. In this context, understanding the skills and competences of the users of the system to make positive use of the range of information in online social networks is essential to predict the long-term effects of MS investments in non-formal health education strategies.

As digital health literacy represents the ability of individuals to search for health information on digital media, interpret it and qualify it in the face of a given situation and, from there, adopt the knowledge to treat or solve a health problem (VAART; DROSSAERT, 2017), this study sought to assess the level of digital health literacy of individuals who use digital media. In addition, we also analyze how sociodemographic factors influence this ability.

## 2. Methodology

This is a cross-sectional, quantitative and exploratory study that included 423 participants who responded to the online questionnaire, developed in Google Forms, disseminated by the online social networks Facebook and WhatsApp as well as by email during the month of September 2019. The online questionnarie was elaborated with sociodemographic questions (age, sex,

education level and income) plus the instrument to assess the level of digital health literacy (eHealth Literacy Scale - eHeals) (NORMAN; SKINNER, 2006).

*eHealth Literacy Scale Instrument (eHeals)*

Developed by Norman and Skinner (2006), it evaluates the level of digital health literacy through eight Likert-type answer items with five alternatives ranging from totally disagree (1) to totally agree (5), whose highest score corresponds to the highest level of literacy. The instrument contains two more questions related to the participants' interest in using health information from digital media, with five Likert-type alternatives ranging from not useful (1) to very useful (5).

Table 1. Questions of the eHealth Literacy Scale (eHeals) instrument validated by Barros (2019).

| |
|---|
| 1. I know what health content is available on the internet. |
| 2. I know where to find useful health content on the internet. |
| 3. I know how to find useful health content on the internet. |
| 4. I know how to use the internet to answer my health questions. |
| 5. I know how to use the health information I find on the internet to help me. |
| 6. I can evaluate the health content I find on the internet. |
| 7. I know how to differentiate reliable content from dubious content on the internet. |
| 8. I feel confident to use information from the internet to make health decisions. |

*Data analysis*

Descriptive data are presented by means and standard deviations that correspond to the characteristics of the participants. The Student's t test was used to verify differences between groups with respect to gender, the Kruskal-Wallis test was used to analyse differences in relation to education and, later, a Mann-Whitney analysis was used to verify differences between specific groups, using a level of statistical significance of 5% ($p < 0.05$). In addition to this significance level, the magnitude of the effect size was used, and Cohen's d coefficient was calculated, which is based on the standardized differences of the means. The reference values considered are $d = 0.20$: small or modest effect; $d = 0.50$: moderate effect and $d = 0.80$: important effect (COHEN, 1992). Correlations between the variables were performed using Pearson's correlation test, at a significance level of 5%. The correlation between two or more variables is represented by the correlation coefficients, that is, values ranging from -1 to +1. Positive values of these coefficients ($r > 0$) indicate direct correlation, whereas negative values ($r < 0$) indicate an inverse correlation. For each correlation test there is a coefficient, and according to Pearson, values between 0 and 0.3 (or 0 and -0.3) are considered negligible; values between 0.31 and 0.5 (or -0.31 and -0.5) are considered weak correlations; values between 0.51 and 0.7 (or -0.51 and -0.7) are considered moderate correlations; values between 0.71 and 0.9 (or -0.71 and 0.9) are considered strong

correlations; and values > 0.9 (or <-0.9) are considered to be very strong correlations (MUKAKA, 2012). All analyses were performed using the Linguagem R software (R Core Team, 2018).

*Ethical considerations*

This study was approved by the Human Research Ethics Committee of the Centro Universitário de Maringá - UniCesumar, according to the rules established in Resolution No. 466/12 and the National Health Council under number 3,474. 675 of 29/07/2019. All individuals who participated in the study gave their online consent in a Free and Informed Consent Form.

## 3. Results

Characteristics of the participants

Of the total of 423 participants, 60% were female (mean age 36.4 years, ± 12.6), and 40% were male (mean age 37.3 years, ± 12.6). With regard to education level, the majority of both gender groups had had completed high school (43% of women and 34.3% of men). In addition, 27.4% of women and 30% of men had postgraduate level of education (Table 1).

Table 1. Sociodemographic characteristics of the research participants.

| Variable | Women n(%) | Men n(%) |
|---|---|---|
| Sex | 288 (60) | 143 (40) |
| Mean age, (SD) | 36.4 (12.6) | 37.3 (12.6) |
| Education level, n(%) | | |
| Incomplete primary level | 4 (1.4) | 4 (2.8) |
| Complete primary level | 29 (10.1) | 9 (6.3) |
| Complete secondary level | 124 (43) | 49 (34.3) |
| Complete tertiary level | 52 (18.1) | 38 (26.6) |
| Post graduation | 79 (27.4) | 43 (30) |

*Relationship of Digital Health Literacy to Sex*

The level of digital literacy of the participants can be considered high in the sense that they feel able to perform digital searches on health-related subjects. Female participants had an average value of 3.64 (± 0.64), and male participants had an average value of 3.67 (± 0.61) (Table 2).

Table 2. Comparison of digital health literacy according to sex.

| | | Women | | Men | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | n | M | SD | M | SD | t | df | p | d |
| **Digital Health Literacy** | 431 | 3.64 | 0.64 | 3.67 | 0.61 | 0.588 | 429 | 0.557 | 0.060 |

n = total number of study participants; M = mean; SD = standard deviation; t = "t" test; df = degree of freedom; p = probability of significance; d = Cohen's coefficient.

According to Table 2, it can be seen that there is no statistically significant difference between the sexes, although male participants have a higher average when compared to female participants, $t (429) = 0.588$, $p > 0.05$. In addition to the analysis of statistical significance between the groups, the magnitude of the verified effect size was used, which was calculated using the Cohen's coefficient. In addition to significant differences, the effect size can be considered small ($d = 0.06$) (COHEN, 1992).

*Relationship between Digital Health Literacy and participants' characteristics*

Correlation analyses were carried out between digital health literacy and the characteristics of the general sample, such as: age, education and family income. The results of the correlation can be seen in Table 3.

Table 3. Correlation between Digital Health Literacy and sample characteristics

| | | Age | Education Level | Income |
|---|---|---|---|---|
| **Age** | r | — | | |
| | *p-value* | — | | |
| **Education Level** | r | 0.202*** | — | |
| | *p-value* | 0.001 | — | |
| **Family income** | r | 0.394*** | 0.519*** | — |
| | *p-value* | 0.001 | 0.001 | — |
| **Digital Health Literacy** | r | 0.037 | 0.131** | 0.168*** |
| | *p-value* | 0.444 | 0.006 | 0.001 |

* p <0,05; ** p < 0,01; *** p < 0,001

According to Table 3, digital health literacy had no significant correlation with the age of the participants, so age was not a variable that interferes with the sample's literacy level. In relation to education and income, the results were different. Both the education and the income of the participants influence their level of digital health literacy. That is, the results demonstrate that the higher the educational level, and also the higher the income, the greater the digital health literacy of the participants.

With regard to the positive correlation between educational level and digital health literacy, there were differences in the level of literacy according to different educational levels. Table 4 shows the statistically significant differences in digital health literacy and educational levels.

Table 4. Comparison between Digital Health Literacy according to educational levels.

| | Education Level | N | Mean | U | p |
|---|---|---|---|---|---|
| **Digital Health Literacy** | Incomplete primary level | 38 | 3.74 | 2576.5 | 0.037* |
| | Complete secondary level | 173 | 3.53 | | |
| | Total | 211 | | | |
| | **Education Level** | **N** | **Mean** | **U** | **p** |
| **Digital Health Literacy** | Complete secondary level | 173 | 3.53 | 7513 | 0.001** |
| | Post graduation | 122 | 3.82 | | |
| | Total | 295 | | | |
| | **Education Level** | **N** | **Mean** | **U** | **p** |
| **Digital Health Literacy** | Complete tertiary level | 90 | 3.60 | 4420 | 0.015** |
| | Post graduation | 122 | 3.82 | | |
| | Total | 212 | | | |

* p < 0,05; ** p < 0,001

With regard to the correlation between education level and literacy, the data analysis of participants showed participants who reported having completed primary education had a higher level of digital health literacy than those with secondary education (p <0.05).

For higher levels of education, it was found that the higher the educational level, the greater the digital health literacy. Participants with a completed post-graduate degree had higher literacy scores than participants with a completed tertiary education (p <0.05) and than those with completed secondary education (p <0.001).

## 4. Discussion

Faced with the progressive increase of fake news in the area of health, the misinformation, generated intentionally or involuntarily, spreads quickly, and compromises the advances of government strategies to face health problems (SILVA; WALMSLEY, 2019; MERCHANT; ASCH, 2018) therefore requiring greater skill from the health system user to use the information available on

digital media. Thus, in the present study, we assessed the level of digital health literacy in individuals who use digital media. We showed that the degree of literacy of the evaluated sample was good, based on previous studies that qualified scores obtained in tests as bad, good and excellent (TOMÁS et al., 2014). Furthermore, we showed that gender and age did not correlate with the degree of digital health literacy, in contrast to other sociodemographic characteristics of the sample, such as level of education and income, which demonstrated positive correlations.

There is a consensus that health literacy is a little-known term in Brazil (MORAIS; KOLINSKY, 2016) and that the understanding of digital health literacy is even more complex. In general, it is defined as the individual's ability to understand health information obtained in digital media to develop knowledge and intervene in individual or collective health (PIAAC, 2018). In this regard, the influence of health information released by reliable sources over the internet, even though it depends on the user's understanding and skills, is produced to trigger beneficial effects related to the promotion of the health of populations (VOSOUGHI et al., 2018). On the other hand, the great supply of false health information, which is disseminated deliberately and progressively shared, is emerging as a potential threat to public health. The democratization of the internet allows fake health news to be spread like real news, using online social networks to drive traffic on the Web and amplify its effects (WASZAK, 2018).

Vosoughi *et al.* (2018) identified that intentionally false health information comes from websites with commercial, financial or ideological objectives. In this unfavourable scenario, there is the aggravating factor that fake news is shared by users more widely and quickly than health information from sources based on scientific evidence (SCHWITZER, 2017). Thus, identifying the level of the digital health literacy of users of online social networks can represent the first step in creating strategies to strengthen ICT in order to use them as a tool to promote non-formal education in the field of health, as well as creating mechanisms to empower users to recognize untrustworthy information.

We show in the present study that individuals who access digital media have a good level of digital health literacy. However, it should be noted that the respondents to the online questionnaire had a high level of education, where about 50% of the participants declared they had completed higher education and approximately 30% had a post-graduate degree. This situation is quite different from the Brazilian reality, in which only 15.3% of the population has a college degree (IBGE, 2017), suggesting the data of this study is relevant to a more specific portion of the population. In addition, we also show that the biological determinants, age and sex, did not correlate with digital health literacy, reaffirming that social issues, such as income and education level, in fact seem to be more relevant for determining the ability to use health information on digital media.

Consequently, the correlation between high income and higher levels of literacy is supported by data that associate income inequality with health, that is, the lower the income, the worse the health conditions (NUTBEAM, 2008). In this context, low income has been correlated with poor diet, obesity, lack of physical exercise, development of chronic non-communicable diseases such as diabetes, hypertension, heart disease and cancer, including mental health problems. It is observed that most of these diseases are related to modifiable

determinants and can be avoided or minimized by changing behaviour to achieve a healthier lifestyle (GUNTZVILLER et al., 2016).

Also with regard to low-income populations, there are communicable diseases such as HIV / AIDS, dengue, enteroparasitosis, and others that are intrisically associated with social determinants of health (RAMOS et al., 2016). It is worth remembering that these communicable diseases are among the priorities in health and education public policies, and as a strategy to combat these diseases, the Ministry of Health uses online social networks to disseminate educational campaigns. Equally, it also uses the official government portals that use ICT to improve and facilitate the population's access to public health services (MOREIRA; PINHEIRO, 2015).

Although the results have shown that people with elementary education have a higher level of digital literacy than those with high school education, this data should be interpreted with caution, as it may be a limitation of the present study, due to the reduced number of participants with schooling at the completed primary level, a circumstance that may reflect on the correlation tests used (LOUREIRO; GAMEIRO, 2011).

Amid so many challenges in the Brazilian scenario, our results reiterate that formal education is a priority and should precede government strategies that seek to use non-formal education, through online social networks. Low educational levels correlate with the low ability to effectively and efficiently use the proposed campaigns and other content published in the Health Ministry portals and those published on the online social networks Facebook, Instagram and Twiter. Furthermore, most scientific articles on the subject point to online social networks as the main vehicle for incorrect or inaccurate health information (WANG et al., 2019), which reaffirms the relevance of the present study in analyzing the degree of digital literacy in health and its relationship with sociodemographic characteristics.

## 5. Conclusion

High levels of education and higher income correlate with better levels of digital health literacy. This study endorses the importance of formal education so that the information or campaigns disseminated by digital media are understood and used to the benefit of the users. The biological determinants, age and sex did not correlate with the level of digital health literacy. In short, it is concluded that government actions that seek a non-formal education strategy in the realm of digital media for the population, must be aware that the full success of this strategy depends on the prioritization of investment in formal education and its consequent improvement in the income of the population.

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**Contribution of each of the authors**

Author 1: Substantial contribution to the analysis and analysis, data interpretation and final review.
Author 2: Contribution to the application of the instruments and final revision of the manuscript.
Author 3: Contribution to the application of the instruments and final revision of the manuscript.
Author 4: Substantial contribution to the analysis and analysis, data interpretation and final review.
Author 5: Substantial contribution to the analysis and analysis, data interpretation and final review.