



USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN HEALTH EDUCATION FOR ADOLESCENTS: INTEGRATIVE REVIEW

USO DE TECNOLOGIAS DA INFORMAÇÃO E COMUNICAÇÃO NA EDUCAÇÃO EM SAÚDE DE ADOLESCENTES: REVISÃO INTEGRATIVA

USO DE TECNOLOGÍAS DE LA INFORMACIÓN Y COMUNICACIÓN EN LA EDUCACIÓN EN SALUD DE ADOLESCENTES: REVISIÓN INTEGRADORA

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ABSTRACT

Objective: to identify in the literature the information and communication technologies used in health education for adolescents. **Method:** integrative review of complete articles available in the databases CINAHL, SCOPUS, MEDLINE/PUBMED and LILACS, through the Health Descriptors "information technology", "health education" and "adolescent" in Portuguese, English and Spanish languages, published between January 2010 and December 2014. **Results:** 23 articles were identified. The use of the following ICTs was verified: text messages through cell phones, websites, virtual learning environments, online courses, online chat, virtual games, blogs and social media. Nursing professionals stand out in the construction of these ICTs and the main themes addressed refer to the promotion of sexual health. **Conclusions:** it is necessary that health professionals recognize the potential of the ICTs and unveil the innumerable possibilities of using these tools as a strategy to promote adolescent health. **Descriptors:** Information Technology; Health Education; Adolescent.

RESUMO

Objetivo: identificar na literatura as tecnologias de informação e comunicação utilizadas na educação em saúde de adolescentes. **Método:** revisão integrativa de artigos completos disponíveis nas Bases de dados CINAHL, SCOPUS, MEDLINE/PUBMED e LILACS, por meio dos DECS "tecnologia da informação", "educação em saúde" e "adolescente", em português, inglês e espanhol, publicados entre janeiro de 2010 a dezembro de 2014. **Resultados:** foram identificados 23 artigos. Verificou-se o uso das seguintes TIC: mensagens de texto por meio de telefone celular, websites, ambientes virtuais de aprendizagem, cursos on-line, chat, jogos virtuais, blogs e mídias sociais. Os profissionais da enfermagem se destacam na construção dessas TIC e as principais temáticas abordadas referem-se à promoção da saúde sexual. **Conclusões:** faz-se necessário que profissionais da saúde reconheçam a potencialidade das TIC e desvelem as inúmeras possibilidades de uso destas ferramentas como estratégia de promoção da saúde dos adolescentes. **Descritores:** Tecnologia da Informação; Educação em Saúde; Adolescente.

RESUMEN

Objetivo: identificar en la literatura las tecnologías de información y comunicación utilizadas en la educación en salud de adolescentes. **Método:** revisión integradora de artículos completos disponibles en las Bases de datos CINAHL, SCOPUS, MEDLINE/PUBMED y LILACS, por medio de los DECS "tecnología de la información", "educación en salud" y "adolescente", en portugués, inglés y español, publicados entre enero de 2010 a diciembre de 2014. **Resultados:** fueron identificados 23 artículos. Se verificó el uso de las siguientes TIC: mensajes de texto por medio de teléfono celular, websites, ambientes virtuales de aprendizaje, cursos on-line, chat, juegos virtuales, blogs y medias sociales. Los profesionales de la enfermería se destacan en la construcción de esas TIC y las principales temáticas abordadas se refieren a la promoción de la salud sexual. **Conclusiones:** es necesario que profesionales de la salud reconozcan la potencialidad de las TIC y desvelen las innumeras posibilidades de uso de estas herramientas como estrategia de promoción de la salud de los adolescentes. **Descriptores:** Tecnología de la Información; Educación en Salud; Adolescente.

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INTRODUCTION

Information and Communication Technologies (ICT) are technologies that have the computer and the internet as the main instruments and should be evaluated as tools for optimizing processes, for example, health care, permanent education and research development. These technologies allow the broadening of access to information through the integration of multiple media, languages and resources, enabling the development of an interactive educational process.¹⁻²

In the field of health, it is necessary to use teaching-learning strategies that allow greater autonomy of the subjects, since the verticalized relationships, in which the professional/teacher is the sole holder of knowledge and the subject is considered a blank sheet, with no previous knowledge, are no longer in evidence.

The ICT have the potential to promote access for teachers, students and the general population to this digital society. However, an emerging challenge is the need to expand adolescents' access to health information. These individuals should be inserted in an environment of reflections and discussions about the issues inherent in their age group. Situations such as adolescent pregnancy, sexuality, drug addiction and bullying are very frequent and can be addressed from the use of ICT in health, since these technological tools are part of the daily life of these adolescents.³

The use of these ICTs aimed at health education for adolescents was verified in the Capes' journal portal, and it was observed a shortage of studies, among which there was a study developed by the extension project of a university from Minas Gerais which carried out activities based on the use of the Virtual Learning Environment (VLE), created for online discussions with adolescents of the first year of high school of a public school, in which 10 topics related to the promotion of health in adolescence were addressed. The results showed that the online environment favored the discussion with greater depth, since some students felt more comfortable in participating and giving an opinion on the subject far from the presence of colleagues and the project team.⁴

ICT, as part of the daily life of adolescents, provides an environment more favorable to the various forms of expression. It is believed that technologies, in addition to promoting communication, especially in some themes, reveal interests, knowledge, perceptions and desires of adolescents.⁵ Thus, the following

question arises: what information and communication technologies are used in health education for adolescents?

The answer will contribute to identify which are the most used themes in health education for adolescents, which professionals are constructing and implementing these technologies, and it will motivate the development of new technologies adapted to the Brazilian reality. Therefore, the objective of this study is to identify in the literature the information and communication technologies used in health education for adolescents.

METHOD

This is an integrative review on the ICTs that have been used in health education for adolescents. Integrative review is the instrument of the Evidence-Based Practice (EBP) which consists of gathering and synthesizing research results on a given topic or issue, in a systematic and orderly manner, contributing to the deepening of the knowledge of the subject under investigation.⁶

In order to conduct this review, the following steps were used: identification of the theme and establishment of the research question; definition of the inclusion and exclusion criteria; definition of the information to be extracted from the selected studies (categorization of studies); evaluation of the studies included in the review; and presentation of the review or synthesis of knowledge.⁷

The selection of the primary studies was performed in December 2014 by searching the following databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), SCOPUS, National Library of Medicine and National Institutes of Health (MEDLINE/PubMed) and Latin American and Caribbean Health Sciences Literature (LILACS). For the search of the articles, authors used the controlled descriptors: Information Technology, Health Education and Adolescent, from the descriptors in Health Sciences/Medical Subject Headings (DeCS/MeSH), which were demarcated according to each database and combined in different ways to ensure breadth of search.

In the databases CINAHL, SCOPUS and MEDLINE/PubMed, the following controlled descriptors were applied in the MeSH: information technology AND health education AND adolescent. The controlled descriptors present in the DeCS, used in the LILACS database, were: *tecnología de la información* AND *educación en salud* AND *adolescente*.

In order to select the sample, the inclusion criteria were: complete article, available free of charge in the electronic media in the said databases, with publication date between January 2010 and December 2014, in the Portuguese, Spanish or English languages, which answered the guiding question. The determination of the period of time was used to ensure an appropriate number of primary studies, since a large number of studies may make it impossible to elaborate the integrative review or insert biases in the succeeding steps of the method.⁶ Duplicated articles, in the same database or not, editorials and letters to the editor were excluded.

From the aggregation of the controlled descriptors, 833 articles were found. Of these,

two articles were in the CINAHL database, 141 in SCOPUS, 684 articles in MEDLINE/PubMed and six in LILACS. Subsequently, the titles and abstracts of the articles were read, after which 783 were excluded, since they did not meet the inclusion criteria; among these, there were repeated articles in the same database or in more than one database, editorials and letters to the editor. Then, a thorough reading of the articles was carried out in full, excluding a total of 24 articles that did not answer to the guiding question; in the end, 23 articles answered the guiding question and were included in this review. Figure 1 shows the results of the articles found can.

Database	Lilacs	Medline/ Pubmed	Cinahl	Scopus	Total
Production found	6	684	2	141	833
Titles and abstracts	5	652	1	125	783
Articles in full	-	16	-	8	24
Selection after reading	1	8	1	13	23
Total	1	8	1	13	23

Table 1. Selection of articles found in electronic databases. Fortaleza (CE), Brazil, 2014.

These articles were analyzed by using an instrument specially constructed for this purpose, containing the following items: article title, journal’s name, year, country and language of publication, type of study and information regarding ICT used in health education for adolescents, issued themes, type of ICT and the professionals involved in the construction and application of technologies.

For the accomplishment of this integrative review, the ethical aspects were preserved and accepted, and the authorship and reference of the analyzed articles were guaranteed to their respective authors.

RESULTS

Of the 23 articles selected, it was evidenced publication in different journals, with a predominance of 17.30% (n = 4) of articles in the Journal of Adolescent Health. As to the country of publication of the studies, 95.65% (n = 22) came from the United

States; 4.34% (n = 1) from Brazil. With regard to the year of publication, 39.13% (n = 9) of articles were published in 2012. Most of the studies that composed this review were published in the English language.

Randomized clinical trials (RCTs) were the most frequent with 39.13% (n = 9), followed by qualitative, 17.39% (n = 4), and development studies, 17.39% (n = 4).

Regarding the most addressed topics in adolescent health education, 52.17% (n = 12) of the articles dealt with sexual and reproductive health, and nurses stood out in the construction and implementation of these ICTs, with 65.21% (n = 15).

Figure 1 shows the distribution of the references included in the integrative review, according to article title, year and journal of publication, developed technology and the results of the application of technology.

Title/Year/Journal	ITC	Main results of application of the technology
Use of Internet Viral Marketing to Promote Smoke-Free Lifestyles among Chinese Adolescents, 2014, PLoS ONE. ⁸	Online viral marketing campaign based on games.	Participants presented a significant attitude change, with 73% of participation with negative attitudes towards smoking after the campaign, compared with 57% before it.
An overview of current and potential use of information and communication	WEB 2.0 tools: social networking sites, wikis, blogs, microblogging, video-sharing sites,	The use of new technologies should be seen as a potential means of improving vaccination coverage among adolescents and, in order to be more effective, they can be combined with traditional

technologies for immunization promotion among adolescents, 2013, Human Vaccines & Immunotherapeutics. ⁹	online games, chat rooms and communities, forums.	methods of health promotion, health education and counseling.
Teens' Use of Digital Technologies and Preferences for Receiving STD Prevention and Sexual Health Promotion Messages: Implications for the Next Generation of Intervention Initiatives, 2013, Sexually Transmitted Diseases. ¹⁰	Text messaging, blog, online video, mobile video and podcast.	Adolescents reported that they were likely/very likely to use a text messaging service (50%), read a blog (48%), watch an online video such as in YouTube (43%), watch a video on their cell phone (35%), or listen to a podcast (29%). Adolescents with a current STD are even more likely than other adolescents of the sample to use a text messaging service to receive information about STD prevention and sexual health promotion. The study suggests that this modality of intervention would be likely to reach these adolescents at greater risk.
Evaluation of a Web-Based Asthma Management Intervention Program for Urban Teenagers: Reaching the Hard to Reach, 2013, Journal of Adolescent Health. ¹¹	Puff City Website.	African-American high school students in the asthma intervention group who received Puff City reported fewer symptoms than adolescents randomized to a control group. Puff City represents a viable strategy for disease improvement and self-management among urban adolescents with asthma.
An Internet Obesity Prevention Program for Adolescents, 2012, Journal of Adolescent Health. ¹²	Online courses. Two programs for the prevention of obesity through the internet in the school context.	Both programs have improved self-efficacy and adolescents' health behaviors in the short term. Adolescents reported that they preferred interactive online education for obesity prevention rather than printed materials and lectures.
The impact of an educational text message intervention on young urban women's knowledge of oral contraception, 2013, Contraception. ¹³	Mobile text messaging.	Daily, educational text messaging can modestly improve knowledge about oral contraceptives, which can promote successful contraception.
Ten Years of TeenHealthFX.com A Case Study of an Adolescent Health Web Site, 2012, Pediatric Clinics of North America. ¹⁴	TeenHealthFX Website.	The site allowed practitioners to get a clearer picture of the concerns and thoughts of adolescents who used this health information resource, as visitors expressed thoughts and sent questions they would not normally feel comfortable doing personally.
Use of Information and Communication Technologies in health education of school-aged adolescents, 2012, J. Health Inform. ¹⁵	VLE "Health in Adolescence".	There was greater participation and interaction of adolescents in the themes, such as teenage pregnancy, violence, drugs and the influence of the group in adolescence. In others, they felt inhibited and participated partially, as in the themes: acne in adolescence, sexuality, adolescence and puberty. The distance favored the discussion with more depth, since some students felt more comfortable to participate and to give an opinion on the theme far from the presence of colleagues and the project team.
An Internet Coping Skills Training Program for Youth With Type 1 Diabetes: Six-Month Outcomes, 2013, Nurs Res. ¹⁶	Two educational interventions through the Internet: TEENCOPE: an internet program based on a successful skill-training for young people with type 1 diabetes. MANAGING DIABETES: educational program for patients with type 1 diabetes.	There were no significant effects on treatment between groups in the first six months after intervention, compared to primary outcomes. The Managing Diabetes group showed a significant increase in social skills compared to the TEENCOPE group. There were significant effects for TEENCOPE (stress-reduction and coping-increase) and for Managing Diabetes (improvement of quality of life).
A pilot test of a tailored mobile and web-based diabetes messaging system for adolescents, 2014, J Telemed Telecare. ¹⁷	Super Ego: individualized text messaging system aimed to improve self-care of diabetic teens combined with a	The study demonstrated that an intervention based on mobile messaging has the potential to improve the clinical outcomes of adolescents with type 1 diabetes. It has contributed to establishing the feasibility and acceptability of cellular programs that are individually adapted to the behaviors and

	website.	characteristics of the patient.
Adolescents' perceptions of a mobile cell phone text messaging enhanced intervention and development of a mobile cell phone based HIV prevention intervention, 2013, J Spec Pediatr Nurs. ¹⁸	Intervention based on mobile cell phones for HIV prevention. Text messages.	Participants shared text messages with peers and encouraged friends to take the HIV test. Adolescents were receptive to the idea of participating in an intervention based on mobile cell phones with the participation of parents and children and that it evidenced that an educational intervention can be effective for the promotion of health.
Improving Health in Adolescents with the Use of Information Technologies, 2012, Online Journal of Nursing Informatics. ¹⁹	Internet-based applications: the network (internet), social media or social networks, voice calls, online games; mobile devices or smartphones (iPods and tablets); Telehealth.	There are some interventions that use internet and text messaging to improve adolescent health. These technologies are effective for changing behavior and improving health outcomes for young people, but there is little or no evidence showing the possible benefits of games and social media in young people's health. More studies are needed to determine the effectiveness of the Internet, text messaging, games and social media as a strategy for health-behavior change.
Innovations in Technology: Social Media and Mobile Technology in the Care of Adolescents with Asthma, 2012, Curr Allergy Asthma Rep. ²⁰	Social media (Facebook and Twitter), websites, mobile technology: text messaging and smartphone apps.	Current studies on the use of technology in adolescents with asthma do not provide consistent evidence of efficacy. Internet-based interventions: social media (Facebook and Twitter): no social media for asthma was identified; Website-based interventions: these three studies do not provide evidence that websites for asthma education and management are effective in the adolescent population; Mobile technology (text messaging): studies have found that asthma patients improved symptoms with the use of this technology; Smartphone Applications: no study has specifically evaluated mobile "apps" as an educational intervention to improve asthma or clinical outcomes.
Avatars using computer/smartphone mediated communication and social networking in prevention of sexually transmitted diseases among North-Norwegian youngsters, 2012, BMC Medical Informatics and Decision Making. ²¹	Website named Virtual Clinic for Sexually Transmitted Diseases (VCSTD). With the use of avatars.	VCSTD avatars could give users anonymity and freedom (facilitating their access to sensitive information) and at the same time may represent an opportunity to change young people's sexual behavior.
Adolescents' Perspectives on the Use of a Text Messaging Service for Preventive Sexual Health Promotion, 2012, Journal of Adolescent Health. ²²	The text messaging service evaluated in this study is called "Connection".	In teenagers' perceptions, the content of the message should be informative (providing new and relevant information), simple (automatically limited to short words and short phrases), and sociable (easily able to be shared with friends). The use of text messages is an innovative way to engage adolescents in learning and in preventive sexual health practices.
A Review of Sexual Health Web Sites for Adolescents, 2012, Clinical Pediatrics. ²³	Websites.	29 websites were found to be relevant for this review. All reviewed sites showed weaknesses in content, usability and interactivity. The Planned Parenthood website was the most comprehensive of the sites evaluated. More research is needed to assess the mechanisms in which online information on sexual health for adolescents influences knowledge and behavior.
Drama and danger: The opportunities and challenges of promoting youth sexual health through online social networks, 2011, AMIA Annu Symp Proc. ²⁴	Online social networks.	The present study shows that online social networks are places where young people communicate extensively about STD/HIV, as well as get to know loving and sexual partners.
Effects of Information	Website	The results showed that educating students through

and Communication Technology on Youth's Health Knowledge, 2011, Asia Pac J Public Health. ²⁵	http://www.teen.hbi.i	health information on the website increased their knowledge of at least 14.5% in environmental health and 48.9% in nutrition and it was statistically significant in all fields (P = 0.000), with exception of mental health.
Improving Low-Income Teen Health Behaviors with Internet-Linked Clinic Interventions, 2011, Sex Res Soc Policy. ²⁶	Five-minute Power point presentation combined with websites in waiting room.	The targeted computer-use approach, which includes access to selected websites, has the promise of helping low-income adolescents, and they actually behave in healthier and more protective ways.
Using Culturally Sensitive Media Messages to Reduce HIV-Associated Sexual Behavior in High-Risk African American Adolescents: Results From a Randomized Trial, 2011, Journal of Adolescent Health. ²⁷	Radio and television messages.	Culturally-adapted mass media messages that are consistently delivered over time have the potential to reach a large audience of high-risk adolescents to support changes in HIV-prevention beliefs and to reduce HIV-associated risk behaviors among older adolescents.
Development and Evaluation of an Educational Interactive CD-ROM For Teens With Cancer, 2010, Pediatr Blood Cancer. ²⁸	Development and evaluation of the Conquering Cancer Network Multimedia CD-ROM versus handbook for adolescents with cancer.	The CD-ROM is an innovative and attractive education tool, the first portable interactive product with on-demand access for adolescents with tumors. This CD was received with more significant enthusiasm by adolescents, both in acceptability and use, who were more likely recommend it to other adolescents with cancer compared to the Handbook Group.
What's in a message? Delivering sexual health promotion to young people in Australia via text messaging, 2010, BMC Public Health. ²⁹	Mobile text messaging.	The message transmission, usually biweekly and on Friday afternoons, was seen as appropriate. Participants said that the messages provided new information, reminded information they already knew and reduced apprehension about the test for sexually transmitted diseases. Mobile phones, especially text messages, offer to health promoters an excellent opportunity to personally engage large numbers of individuals at a low cost.
Cell Phone Intervention to Improve Adherence: Cystic Fibrosis Care Team, Patient, and Parent Perspectives, 2010, Pediatric Pulmonology. ³⁰	CFFONE™ - mobile prototype adapted for the web.	The results of this study support the acceptability, viability and utility of a web-enabled mobile phone for adolescents with Cystic Fibrosis. The data from the focus groups with health professionals indicated the need for this intervention and indicated that CFFONE™ would be likely to improve social knowledge and support, and unlikely to improve adherence. Adolescents, adults and parents rated CFFONE™ as likely to improve adherence.

Figure 1. Distribution of the references included in the integrative review according to article title, year and journal of publication, developed technology, and the results of the application of the technology among adolescents. Fortaleza (CE), Brazil, 2014.

DISCUSSION

The health sector, as well as other sectors of society, lacks new technologies that can increase knowledge and empower the community with health information.³¹ In this context, an emerging challenge has been the need to expand adolescents' access to health information.³²

Adolescence, a rite of passage from childhood to the adult world, is the stage of life comprised between the ages of 10 and 19, marked by a complex process of biopsychosocial growth and development.³² It is a critical period for the development of personal and interpersonal skills and of abilities to live and make decisions. It is also a period of doubts, conflicts, changes and

discoveries, which may incite the use of alcohol and other drugs, involvement in situations of violence, unprotected sex,³³ and is therefore considered a phase of greater risk vulnerability. Thus, it is necessary for adolescents to have access to quality information on aspects related to disease prevention and health promotion.⁴

Health professionals have the ICTs at their disposal, which are valuable tools in health education for adolescents, since these resources are part of the daily life of this public and awaken in them a greater interest in learning.

The findings of this review show that there are several ICTs that can be used in health education for adolescents, among which are listed: text messages through cell phones,

Pinto ACS, Scopacasa LF, Bezerra LLAL et al.

websites, virtual learning environments, online courses, online chat, forum, virtual games, blogs and social media.

ICTs have become an important part of today's adolescents' lives and their primary means of obtaining information. The new Internet generation based on social networking technologies has been increasingly used for health purposes by lay people and professionals.⁹ Browsing the internet for health information is simpler and more convenient, especially for teens, than reading specialized literature or consulting a health professional.³⁴⁻³⁵ Thus, these tools enable health professionals to reach the adolescent public and promote the diffusion of knowledge related to health.

Through the ICTs, themes such as smoking, vaccination coverage among adolescents, obesity, sexual health, teenage pregnancy, violence, drugs, puberty, group influence, and others are discussed. Some studies have revealed its use in health education for adolescents affected by diseases such as type 1 diabetes mellitus, asthma, cancer and cystic fibrosis.

Based on the results of the application of the technologies, most of the studies reveal that ICTs are tools that aid in health education for adolescents. In this regard, authors state that health technologies have a broad scope and power of influence and are ideal for providing information on healthy behaviors. In this way, e-Health can complement and reinforce health promotion messages. However, its tools should be designed to complement other health communication channels, be easy to use by health professionals, and communicate effectively with different users.³⁶

Technological resources are commonly used by adolescents seeking health information especially related to issues considered by these as embarrassing, such as sexuality and puberty.

In this sense, a Brazilian study related the experiences lived during an extension project related to the use of information technologies by school adolescents. The results of that research showed that some themes, such as adolescents' relationship with parents and relatives, anorexia and bulimia, the participation of adolescents was greater in the virtual than in the face-to-face meeting. Thus, it is noticed that online meetings favored participation and discussion, since the students felt more uninhibited to solve their doubts.⁴

The ease of getting health information through the internet allows people to be more

Use of information and communication technologies...

informed about their health concerns. The anonymity and confidentiality provided by the network allow for greater exploration of issues that may otherwise be not discussed because they are embarrassing issues such as STDs, illicit drug use and sexual lifestyles. Thus, young people, particularly those hesitant to raise sensitive or private issues with their parents or teachers, may use it to obtain information in order to enable research on their privacy.³⁷ On the other hand, it should not be forgotten that the virtual environment provides information that not always have a quality control, and may be the source of incorrect or inaccurate information.

The main topics addressed by ICTs in health education for adolescents found in the literature are related to the promotion of sexual health and support for those with chronic illness.

In adolescence, sexuality presents itself simultaneously as a physical, psychological and social change.³⁸ In some families, adolescents do not find space to talk about sexuality with their parents, since cultural values do not admit the debate of these themes during childhood or adolescence.³⁹ However, they seek out other means, such as television, friends and magazines, which often leads to insufficient information, making them vulnerable to unplanned pregnancy and STDs. This vulnerability is also associated with the onset of early sexual life or the non-use of contraceptive methods.⁴⁰

In this context, ICTs appear as important instruments for the promotion of adolescent sexual health. However, it is important to emphasize the importance of health professionals to explore these resources by providing quality and attractive health information.

Studies^{10,18,21,22,24,26-7,29} have shown positive results regarding the application of ICT in the promotion of sexual health. As for the type of ICT, text messages and websites were the most used.

The use of text messaging through a cell phone is an innovative way to engage adolescents in learning and preventive health practices. Text messages can enable efficient delivery of health information and are a discrete way for adolescents to obtain important health content, especially for private issues such as sexual health.²²

ICT has been used in the health education of adolescents with chronic pathologies so that these individuals become prepared to take responsibility for self-care.

Pinto ACS, Scopacasa LF, Bezerra LLAL et al.

In the present review, studies^{11,16-7,28,30} have report the construction and application of ICTs aimed at adolescents with chronic diseases, used to provide information about the disease, encourage coping skills and motivate teenagers for self-care. The results show that such tools have the potential to assist in the education of chronic clients. The use of ICT provides benefits in treatment, collaborate with the reduction of stress and with the development of coping strategies.

Contrary to what was evidenced by the above mentioned studies, a review study²⁰ that sought to analyze technological interventions in the adolescent asthmatic population concluded that current studies on the use of technology among asthmatic adolescents do not provide consistent evidence of its efficacy; however, it affirms that positive attitudes towards the use of social media or mobile technology by adolescents opens the possibility for future studies to further explore the potential benefits of such interventions.

With the advancement of ICTs, it has become increasingly common to search virtual networks for diagnoses in order to understand the signs and symptoms present in the individual who is facing a situation of illness. In 2011, the search for health information became the third most common online activity.⁴¹

The Internet offers an interactive and dynamic means for disseminating information, changing attitudes and behavior. Through them and other electronic means of communication, a great impact has been achieved in the dissemination of information and research.⁴² Sources available as blogs, personal pages on social networks and virtual support groups produce knowledge based on the experience of each patient, a knowledge that is shared and multiplied in the various forms of virtual contact⁴³

CONCLUSION

The present study contributed to the expansion of knowledge about the use of information and communication technologies in health education for adolescents.

ICTs represent instruments that can aid in the health education process of this public. It is important to emphasize that for this process to be effective it is important that these tools are attractive and interactive and that health information is made available through them.

Studies have shown that ICTs are effective ways to promote adolescent health. However, some results point to the need for further

Use of information and communication technologies...

studies to analyze the effectiveness of ICTs as a means to change health behavior.

The publications analyzed also discussed the use of information technologies in sexual education and in the provision of actions and information for adolescents affected by chronic pathologies. The application of ICTs in health of chronic patients allows clients to experience their chronic condition with autonomy and high self-esteem, since it enables the dissemination of knowledge. ICTs have also shown to be promising tools for the promotion of sexual health, since they enable adolescents to clarify their doubts anonymously.

There were gaps in the production of scientific articles related to the subject in Brazil, which shows an underutilization of such tools in the national scenario, since the majority of studies on ICTs were published in English and were from the USA.

It is necessary that health professionals recognize the potential of ICTs and unveil the numerous possibilities of using these tools as a strategy to reach adolescents with a view to influencing their health behaviors. Therefore, it is relevant that such tools are developed and applied not only to provide content, but also to provide shared knowledge-construction through mechanisms that allow virtual dialogue with users, thus developing the critical thinking of adolescents.

REFERENCES

1. São Paulo (SP). Secretaria Municipal de Educação. Diretoria de Orientação Técnica. Orientações curriculares: proposições de expectativas de aprendizagem - Tecnologias de Informação e Comunicação. Secretaria Municipal de Educação - São Paulo: SME/DOT, 2010.

2. Dal Sasso GT, Silveira DT, Barbosa SF, Évora YD, Marin HF. Tecnologias da informação e da comunicação em enfermagem e telenfermagem. In: Prado C, Peres HH, Leite MM. Tecnologia da informação e da comunicação em enfermagem. São Paulo: Atheneu; 2011. p.113-25.

3. Pereira LL, Cordenonsi AZ. Softwares educativos: uma proposta de recurso pedagógico para o trabalho de reforço de leitura e escrita com alunos dos anos iniciais. Novas Tecnologias na Educação [Internet]. 2009 [cited 2014 Dec 10];7(3):1-13. Available from: <file:///C:/Users/agnes/Downloads/13587-50990-1-PB.pdf>

4. Cavalcante RB, Ferreira MN, Maia LLQGN, Araujo A, Silveira RCP. Uso de Tecnologias da Informação e Comunicação na educação em saúde de adolescentes escolares. J Health

Pinto ACS, Scopacasa LF, Bezerra LLAL et al.

Use of information and communication technologies...

- Inform [Internet]. 2012 [cited 2014 Dec 08];4(4):182-6. Available from: <http://www.jhi-sbis.saude.ws/ojs-jhi/index.php/jhi-sbis/article/viewFile/197/142>
5. Barros CC, Ferreira NJL. Adolescência e MSN: o arranjo tecnológico da subjetividade. *Pesqui Prát Psicossociais* [Internet]. 2010 [cited 2014 Dec 20];5(1):30-8. Available from: http://www.ufsj.edu.br/portal2-repositorio/File/revistalapip/volume5_n1/barros_e_netto.pdf
6. Mendes KDS, Silveira RCCP, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. *Texto contexto-enferm* [Internet]. 2008 [cited 2014 Dec 02];17(4):758-64. Available from: <http://www.scielo.br/pdf/tce/v17n4/18.pdf>
6. Galvão CM, Mendes KDS, Silveira RCCP. Revisão integrativa: método de revisão para sintetizar as evidências disponíveis na literatura. In: Brevideilli MM, Sertório SCM. *Trabalho de conclusão de curso: guia prático para docentes e alunos da área da saúde*. São Paulo: Iátrica; 2010.p.105-26.
7. Ip P, Lam T-H, Chan SS-C, Ho FK-W, Lo LA, et al. Use of Internet Viral Marketing to Promote Smoke-Free Lifestyles among Chinese Adolescents. *PLoS ONE* [Internet]. 2010 [cited 2014 Dec 20];9(6):e99082. Available from: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0099082>
8. Amicizia D, Domnich A, Gasparini Z, Bragazzi NL, Lai PL, Panatto D. An overview of current and potential use of information and communication technologies for immunization promotion among adolescents. *Human Vaccines & Immunotherapeutics* [Internet]. 2013 [cited 2014 Dec 15];9(12):2634-42. Available from: <http://www.tandfonline.com/doi/full/10.4161/hv.26010>
9. Buhi ER, Klinkenberger N, Hughes S, Blunt HD, Rietmeijer C. Teens' Use of Digital Technologies and Preferences for Receiving STD Prevention and Sexual Health Promotion Messages: Implications for the Next Generation of Intervention Initiatives. *Sex Transm Dis* [Internet]. 2013 [cited 2014 Dec 11];40(1):52-4. Available from: http://journals.lww.com/stdjournal/Fulltext/2013/01000/Teens_Use_of_Digital_Technologies_and_Preferences.10.aspx#
10. Joseph CL, Ownby DR, Havstad SL, Saltzgaber J, Considine S, Johnson D et al. Evaluation of a Web-Based Asthma Management Intervention Program for Urban Teenagers: Reaching the Hard to Reach. *J Adolesc Health* [Internet]. 2013 [cited 2014

- Dec 13];52(4):419-26. Available from: [http://www.jahonline.org/article/S1054-139X\(12\)00314-X/pdf](http://www.jahonline.org/article/S1054-139X(12)00314-X/pdf)
11. Whittemore R, Jeon S, Grey M. An Internet Obesity Prevention Program for Adolescents. *J Adolesc Health* [Internet]. 2013 [cited 2014 Dec 13];52(4):439-47. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3608746/>
12. Hall KS, Westhoff CL, Castaño PM. The impact of an educational text message intervention on young urban women's knowledge of oral contraception. *Contraception* [Internet]. 2013 [cited 2014 Dec 18];87(4):449-54. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3548974/>
13. Borzekowski DL1, McCarthy C, Rosenfeld WD. Ten Years of TeenHealthFX.com: A Case Study of an Adolescent Health Web Site. *Pediatr Clin North Am* [Internet]. 2012 [cited 2014 Dec 07];59(3):717-27. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/22643176>
14. Cavalcante RB, Ferreira MN, Maia LLQGN, Araujo A, Silveira RCP. Uso de Tecnologias da Informação e Comunicação na educação em saúde de adolescentes escolares. *J Health Inform* [Internet]. 2012 [cited 2014 Dec 08];4(4):182-6. Available from: <http://www.jhi-sbis.saude.ws/ojs-jhi/index.php/jhi-sbis/article/viewFile/197/142>
15. Whittemore R, Jaser SS, Jeon S, Liberti L, Delamater A, Murphy K, et al. An Internet Coping Skills Training Program for Youth With Type 1 Diabetes: Six-Month Outcomes. *Nurs Res* [Internet]. 2012 [cited 2014 Dec 08];61(6):395-404. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3623558/>
16. Mulvaney SA, Anders S, Smith AK, Pittel EJ, Johnson KB. A pilot test of a tailored mobile and web-based diabetes messaging system for adolescents. *J Telemed Telecare* [Internet]. 2012 Mar [cited 2014 Dec 14];18(2):115-8. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4060437/>
17. Cornelius JB, St Lawrence JS, Howard JC, Shah D, Poka A, McDonald D, White AC. Adolescents' perceptions of a mobile cell phone text messaging enhanced intervention and development of a mobile cell phone-based HIV prevention intervention. *Spec Pediatr Nurs* [Internet]. 2012 Jan [cited 2014 Dec 12];17(1):61-9. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3614069/>

Pinto ACS, Scopacasa LF, Bezerra LLAL et al.

Use of information and communication technologies...

18. Paul L. Improving Health in Adolescents with the Use of Information Technologies. *Online Journal of Nursing Informatics (OJNI)* [Internet]. 2012 Feb [cited 2014 Oct 12];16(1):1199-203 [cited 2014 Oct 16]. Available from: <http://ojni.org/issues/?p=1199>
19. Nickel A, Dimov V. Innovations in Technology: Social Media and Mobile Technology in the Care of Adolescents with Asthma. *Curr Allergy Asthma Rep* [Internet]. 2012 [cited 2014 Nov 12];12(1):607-12. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/22976493>
20. Gabarron E, Serrano JA, Wynn R, Armayones M. Avatars using computer/smartphone mediated communication and social networking in prevention of sexually transmitted diseases among North-Norwegian youngsters. *BMC Medical Informatics and Decision Making* [Internet]. 2012 [cited 2014 Oct 25];12(120):[about 5 p]. Available from: <http://bmcmedinformdecismak.biomedcentral.com/articles/10.1186/1472-6947-12-120>
21. Perry RC, Kayekjian KC, Braun RA, Cantu M, Sheoran B, Chung PJ. Adolescents' Perspectives on the Use of a Text Messaging Service for Preventive Sexual Health Promotion. *J Adolesc Health* [Internet]. 2012 Sep [cited 2014 Dec 14];51(3):220-5. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/22921131>
22. Whiteley LB, Mello J, Hunt O, Brown LK. A Review of Sexual Health Web Sites for Adolescents. *Clin Pediatr (Phila)* [Internet]. 2012 Mar [cited 2014 Dec 14];51(3):209-13. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/21946254>
23. Veinot TC, Campbell TR, Kruger D, Grodzinski A, Franzen S. Drama and danger: The opportunities and challenges of promoting youth sexual health through online social networks. *AMIA Annu Symp Proc* [Internet]. 2011 [cited 2014 Dec 22];2011:1436-45. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/22195207>
24. Ghorbani NR, Heidari RN. Effects of Information and Communication Technology on Youth's Health Knowledge. *Asia Pac J Public Health* [Internet]. 2011 [cited 2014 Dec 12];23(3):363-368. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/19625324>
25. Marion N, Howard & Jackie A, Davis & Marie EM. Improving Low-Income Teen Health Behaviors with Internet-Linked Clinic

- Interventions. *Sex Res Soc Policy* [Internet]. 2011 [cited 2014 Nov 12];50-7. Available from: <http://link.springer.com/article/10.1007/s13178-011-0037-2>
26. Sznitman S, Vanable PA, Carey MP, Hennessy M, Brown LK, Valois RF *et al.* Using Culturally Sensitive Media Messages to Reduce HIV-Associated Sexual Behavior in High-Risk African American Adolescents: Results From a Randomized Trial. *J Adolesc Health* [Internet]. 2011 Sept [cited 2014 Nov 12];49(3):244-51. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3159865/>
27. Jones JK, Kamani SA, Bush PJ, Hennessy KA, Marfatia A, Shad AT. Development and Evaluation of an Educational Interactive CD-ROM for teens with Cancer. *Pediatr Blood Cancer* [Internet]. 2010 [cited 2014 Oct 12];55(3):512-9. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3324939/>
28. Gold J, Lim MSC, Hellard ME, Hocking JS, Keogh L. What's in a message? Delivering sexual health promotion to young people in Australia via text messaging. *BMC Public Health* [Internet]. 2010 [cited 2014 Dec 05];10:792. Available from: <http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-10-792>
29. Marciel KK, Saiman L, Quittell LM, Dawkins K, Quittner AL. Cell Phone Intervention to Improve Adherence: Cystic Fibrosis Care Team, Patient, and Parent Perspectives. *Pediatr Pulmonol* [Internet]. 2010 Feb [cited 2014 Dec 15];45(2):157-64. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/20054860>
30. Moraes IHS, Veiga L, Vasconcellos MM, Santos SRFR. Inclusão digital de conselheiros de saúde: uma política para a redução da desigualdade social no Brasil. *Ciênc saúde coletiva* [Internet]. 2009 [cited 2014 Dec 15];14(3):879-88. Available from: http://www.scielo.br/pdf/csc/v14n3/en_23.pdf
31. Ministério da Saúde. Secretaria de Atenção à Saúde. Área de Saúde do Adolescente e do Jovem. Marco legal: saúde, um direito de adolescentes. Brasília (DF): Ministério da Saúde; 2005.
32. Giacomozzi AI, Itokasu MC, Luzardo AR, Figueiredo CDS, Vieira M. Levantamento sobre uso de álcool e outras drogas e vulnerabilidades relacionadas de estudantes de escolas públicas participantes do programa saúde do escolar/saúde e prevenção nas escolas no município de Florianópolis. *Saúde soc* [Internet]. 2012 [cited 2014 Dec

Pinto ACS, Scopacasa LF, Bezerra LLAL et al.

- 01];21(3):612-22. Available from: <http://dx.doi.org/10.1590/S0104-12902012000300008>.
33. Kata A. A postmodern Pandora's box: antivaccination misinformation on the Internet. *Vaccine* [Internet]. 2010 [cited 2014 Dec 02];28:1709-16. Available from <https://www.ncbi.nlm.nih.gov/pubmed/20045099>
34. Gray NJ, Klein JD, Noyce PR, Sesselberg TS, Cantrill JA. Health information-seeking behaviour in adolescence: the place of the internet. *Soc Sci Med* [Internet]. 2005 [cited 2014 Dec 10];60:1467-78. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15652680>
35. Kreps GL, Neuhauser L. New directions in eHealth communication: Opportunities and challenges. *Patient Educ Couns* [Internet]. 2010 [cited 2014 Dec 10];78(3):329-36. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/20202779>
36. Kanuga M, Rosenfeld WD. Adolescent Sexuality and the internet: The Good, the Bad, and the URL. *J Pediatr Adolesc Gynecol* [Internet]. 2004 [cited 2014 Dec 19];17(2):117-24. Available from: <http://www.sciencedirect.com/science/article/pii/S1083318804000166>
37. Roehrs H, Maftum MA, Zagonel IPS. Adolescência de Professores Percepção de fazer ensino fundamental. *Rev Esc Enferm USP* [Internet]. June 2010 [cited 2012 July 17];44(2):421-8. Available from: www.scielo.br/pdf/reeusp/v44n2/26.pdf
38. Oliveira DC, Gomes AMT, Pontes APM, Salgado LPP. Atitudes, sentimentos e imagens na representação social da sexualidade entre adolescentes. *Esc Anna Nery Rev Enferm* [Internet]. 2009 [cited 2012 Oct 17];13(4):817-23. Available from: <http://www.scielo.br/pdf/ean/v13n4/v13n4a18.pdf>
39. Alves CA, Brandão ER. Vulnerabilidades no uso de métodos contraceptivos entre adolescentes e jovens: interseções entre políticas públicas e atenção à saúde. *Ciênc saúde coletiva* [Internet]. 2009 [cited 2012 July 17];14(2):661-70. Available from: <http://dx.doi.org/10.1590/S1413-81232009000200035>
40. Hamm MP, Chisholm A, Shulhan J, Milne A, Scott SD, Given LM, et al. Social media use among patients and caregivers: a scoping review. *BMJ Open* [Internet]. 2013 [cited 2012 Sep 18];3(5):e002819. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/23667163>

Use of information and communication technologies...

41. Polit DF, Beck CT. *Fundamento da Pesquisa em Enfermagem: avaliação de evidências para a prática da enfermagem*. 7th ed. Porto Alegre: Artmed; 2011.
42. Ortega F, Zorzanelli R, Meierhoffer LK, Rosário CA, Almeida CF, Andrada BFCC, et al. A construção do diagnóstico do autismo em uma rede social virtual brasileira. *Interface comun saúde educ* [Internet]. 2013 [cited 2014 Oct 20];17(44):119-32. Available from: <http://www.scielo.br/pdf/icse/v17n44/a10v17n44.pdf>

Submission: 2016/01/19

Accepted: 2016/12/28

Publishing: 2017/02/01

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