Development and testing of a mobile application prototype for counseling on the correct use of contraceptive methods, prevention of HPV and other sexually transmitted infections aimed at adolescents

Desarrollo y prueba de un prototipo de aplicación móvil para la consejería sobre el uso correcto de métodos anticonceptivos, prevención del VPH y otras infecciones de transmisión sexual dirigida a adolescentes

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CONAHCYT classification:

DOI: https://doi.org/10.35429/H.2024.10.58.67

Area: Humanities and Behavioral Sciences
Field: Nursing and pedagogy
Discipline: Nursing speciality
Subdiscipline: Other

Key Handbooks

The use of mobile applications through information and communication technologies (ICT) has contributed to the transition of a new paradigm based on technology that can be used to enable young people to obtain knowledge and safe information, so that they can become aware of the importance of having healthy sexual practices and behaviors, based on solid knowledge regarding their sexual life, allowing them to develop self-care and prevention measures as a means of protection. In this way, mobile devices can be used as an alternative to improve coverage and access to health services, with emphasis on the first level of care and preventive services. Currently, a gradual increase in the incorporation of risky sexual practices has been identified, since barriers still persist in access to sexual and reproductive health (SRH) services for adolescents, mainly access to contraceptive methods with the consequent lack of confidentiality. This is why the media, including interactive media such as the Internet through cell phones, represent a sector with significant potential to provide information and to influence values and norms that strengthen adolescent health. 3. Outline the main conclusions of the research An application for cell phones with Android operating system, freely distributed, aimed at promoting content related to sexual health, was obtained and made available to adolescents. The implementation of the educational intervention was effective, as it provided participants with experience in improving knowledge of sexually transmitted infections (STIs), and contraceptive methods. Its main focus is to respond to the information and knowledge needs provided through interactive and playful reading.

Citation: Gutiérrez-Enríquez, Sandra Olimpia, Rivera-Gómez, Jessica Margarita, Terán-Figueroa, Yolanda and Acuña-Aradillas, Jorge Martín. 2024. Development and testing of a mobile application prototype for counseling on the correct use of contraceptive methods, prevention of HPV and other sexually transmitted infections aimed at adolescents. 58-67. ECORFAN.

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Resume

Objective: To develop and test a prototype mobile application. **Methods:** For the development and evaluation of the prototype, 7 levels were applied according to the TRLS methodology (NASA technological maturity levels). The study was conducted from October 2021 to June 2023. 22 students from a public high school in San Luis Potosí, Mexico, participated. **Results:** In the global measurement, a mean of 54.48 was obtained in the pre-intervention and the post-intervention 67.67 (t=-9.12 p= <.001). In the indicator of sexually transmitted infections, a mean of 19.14 before the intervention and after 22.38 (t=-4.269 p= <.001). In risk sexual behaviors before the intervention 14.61 and after 22.38 (t=-6.00 p= <.001). In the secure sources of information, 4.95 before and 4.85 after the intervention (t= -54,3 p= .325). In contraceptive methods before the intervention 15.76 and after 18.04. (t=20.7 p=<.001). **Conclusion:** the educational intervention through digital technologies was effective.

Development and testing of a mobile application prototype for counseling on the correct use of contraceptive methods, prevention of HPV and other sexually transmitted infections aimed at adolescents				
Objetive		Methodology		Contribution
To develop and test a prototype mobile application to provide counseling to adolescents on the correct use of contraceptive methods and the prevention of HPV and other sexually transmitted infections.		For the development and evaluation of the prototype, 7 levels were applied according to the TRLS methodology (NASA technological maturity levels). The study was conducted from October 2021 to June 2023. 22 students from a public high school in San Luis Potosí, Mexico.		The participants' experience using the mobile app was outstanding. The indicators in which the most important increases in knowledge were identified were risk sexual behaviors, prevention of HPV and other sexually transmitted infections, contraceptive methods, and safe means of information. The educational intervention through digital technologies was effective.

Mobile application, prototype, sexually transmitted infections

Resumen

Objetivo: Desarrollar y probar un prototipo de aplicación móvil. Métodos: Para el desarrollo y evaluación del prototipo se aplicaron 7 niveles según la metodología TRLS (niveles de madurez tecnológica de la NASA). El estudio se realizó de octubre de 2021 a junio de 2023. Participaron 22 estudiantes de una escuela secundaria pública de San Luis Potosí, México. Resultados: En la medición global se obtuvo una media de 54,48 en la pre-intervención y en la pos-intervención 67,67 (t=-9,12 p= <.001). En el indicador de infecciones de transmisión sexual, una media de 19,14 antes de la intervención y después de 22,38 (t=-4.69 p= <.001). En conductas sexuales de riesgo antes de la intervención 14,61 y después 22,38 (t=-6 p= <.001). En fuentes de información segura, 4,95 antes y 4,85 después de la intervención (t= -54.3, p= .325). En métodos anticonceptivos antes de la intervención 15.76 y después 18.04 (t=20.7 p= <.001). Conclusión: la intervención educativa a través de tecnologías digitales fue efectiva.

Desarrollo y prueba de un prototipo de aplicación móvil para la consejería sobre el uso correcto de métodos anticonceptivos, prevención del VPH y otras infecciones de transmisión sexual dirigida a adolescentes				
Objetivo		Metodología		Contribución
Desarrollar y probar un prototipo de aplicación móvil para la consejería sobre el uso correcto de métodos anticonceptivos, prevención del VPH y otras infecciones de transmisión sexual dirigida a adolescentes.		Para el desarrollo y evaluación del prototipo se aplicaron 7 niveles según la metodología TRLS (niveles de madurez tecnológica de la NASA). El estudio se realizó de octubre de 2021 a junio de 2023. Participaron 22 estudiantes de una escuela secundaria pública de San Luis Potosí, México.		La experiencia de los participantes al utilizar la aplicación móvil fue buena. Los indicadores en los que se identificaron incremento de los conocimientos fueron las conductas sexuales de riesgo, prevención del VPH y otras infecciones de transmisión sexual, métodos anticonceptivos y medios de información seguros. La intervención educativa a través de tecnologías digitales fue efectiva.

Aplicación móvil, prototipo, infecciones de transmisión sexual.

Introduction

The onset of reproductive life in adolescence is part of a maturation process leading to puberty; there is a strong relationship between maturation rates and the age of onset of sexual activity. Considerable numbers of young people in this age range suffer the consequences of inadequate and insufficient information on reproductive health issues, resulting in large numbers of women becoming pregnant and having complications in childbirth or abortion. In general, adolescents are also at higher risk of contracting sexually transmitted infections, including HIV/AIDS (Encuesta Nacional de Salud y Nutrición ENSANUT 2018).

Important biological, psychological and social changes occur during early adolescence. These changes are related to significant events in the lives of individuals, such as the onset of sexual life, and the beginning of the reproductive trajectory, the conditions in which decisions are made about their sexuality, the elements and services available to them, as well as the development opportunities available, have an important effect on their quality of life (Güemes-Hidalgo Et al 2017).

In terms of sexual and reproductive health (SRH), the main risks for this population are unplanned, involuntary and unprotected sexual debut, exposure to unplanned, unwanted or unsafe pregnancies, or exposure to a sexually transmitted infection, thus becoming a serious public health problem. Globally, a large number of adolescents are sexually active before the age of 20, and the vast majority (around 60 per cent) do not use any protection against pregnancy or against the risk of acquiring an STI or becoming infected with HIV. In Mexico, young people begin their sexual lives between the ages of fifteen and nineteen, on average.

The vast majority of them (97 per cent) know at least one method of contraception; however, more than half of them did not use any at the time of their first sexual intercourse. Data from the Mexican Ministry of Health show that the greatest unmet demand for contraceptive methods corresponds to adolescents. In terms of information related to STIs, nine out of ten young Mexicans say they are aware of any of the prevention methods. The Mexican Institute of Youth makes a more detailed analysis since, in the case of those who live in urban areas, their level of knowledge to prevent STIs is 10 percentage points higher than that of young people living in rural areas. When analysing pregnancy among young women, it is found that 12.7% of young women between 15 and 19 years of age have been pregnant (UNFPA 2024).

In Mexico, Sexually Transmitted Diseases are increasing in the shadow of the HIV/AIDS pandemic. According to the Epidemiological Bulletin of the Ministry of Health, as of week 33 of 2021 (covering 15-21 August), 7,930 new cases of HIV (Human Immunodeficiency Virus) infection, 5,810 cases of syphilis and 4,250 cases of herpes had been registered. In addition, the states with the greatest increase in HIV infections were the State of Mexico, with 811; Veracruz, with 699; Jalisco, 589; Quintana Roo, 515; Puebla, 454; Nuevo León, 440; and Baja California, with 435 cases. This corresponds to 49.72% of all new cases in the country (Political Expansion 2022).

STIs are predominantly spread through sexual contact, including vaginal, anal and oral sex. Some STIs can also be transmitted from mother to child during pregnancy, childbirth and breastfeeding. STIs have profound effects on sexual and reproductive health worldwide. The World Health Organization (WHO) reports that an estimated 16 million 15-19 year olds and approximately 1 million girls under the age of 15 become pregnant, mostly in low- and middle-income countries; complications during pregnancy and childbirth are the second leading cause of death among adolescent girls aged 15-19 globally (World Health Organization 2022).

WHO estimates that, in 2020, there were about 374 million new infections of one of these four STIs: chlamydia (129 million), blennorrhoea (82 million), syphilis (7.1 million) and trichomoniasis (156 million). The number of people with genital HSV (herpes) infection was estimated to be more than 490 million in 2016, and more than 300 million women are infected with human papillomavirus (HPV), the leading cause of cervical cancer. Some 296 million people suffer from chronic hepatitis B (World Health Organization 2021). In this sense, and in terms of the incorporation of information and communication technologies (ICT) in education, the possibility of using mobile applications to obtain knowledge has been evaluated, as their usefulness is widespread among the population, so the creation of a technological tool could be an excellent resource to promote the prevention of STIs and encourage healthy sexual practices (Fandos-Garrido M 2003).

ICTs promote more interactive and participatory learning, favouring work in the classroom. It opens up the possibility of learning at a distance and in different contexts. It makes it possible for young people to maintain a pace that is more personalised to their needs. Society has become aware of the importance of science and its influence on issues such as health, resources and means of communication, conditions that improve the quality of human life. The growing influence of technology, its contribution to the transformation of our conceptions and ways of life, makes it necessary to consider the introduction of scientific and technological education as a key element of the general culture of future citizens, preparing them to understand the world in which they live and to make the necessary decisions during their sexual life (Fandos-Garrido M 2003).

A large percentage of adolescents seek health information online on their mobile devices, which means that mobile applications are useful for promoting and improving good practices. New IT solutions are continually being created in response to health problems. In relation to sexual and reproductive health, several computer applications have been created, their focus is to respond to the information and knowledge needs of the adolescent population, which is provided through interactive reading and constitutes, in turn, a means of access to sexual health services, allowing self-assessment of knowledge and information related to sexual health and characteristics specific to adolescents.

According to the World Health Organization (WHO), health developments mainly include applications (apps) aimed directly or indirectly at maintaining or improving people's healthy behaviours, quality of life and well-being. The abbreviation for mobile health is ‘mHealth’, a term used to refer to the practice of medicine and public health supported by mobile devices (University of Salamanca. Useful mobile applications for everyday life and health 2024).

According to the report ‘The Mobile Health Global Market Report 2013-2017: The Commercialization of mHealth apps’, 70 % of apps are intended for patients and 30 % are apps for professional use. Among all health apps, disease follow-up monitoring will be the main development of mHealth apps for patients: in general, the apps with the greatest future impact will be those that enable information gathering, diagnosis and treatment, as well as those dedicated to prevention. The greatest impact for the patient is expected to be related to counselling and follow-up after the initial visit to the doctor. In addition, it is estimated that the use of mobile applications (apps) could improve the efficiency of patient care and minimise up to 30% of the time spent accessing and analysing information, with an economic saving of 15% of healthcare utilisation costs through remote monitoring via mobile apps (Alonso-Arévalo Et al 2017).

In this way, service providers should also explore other less traditional and more innovative ways of guiding, contributing to and promoting health that raise users' awareness. It is also essential to mention the importance of health personnel as agents of change at the administrative level, when evaluating, designing or restructuring health programmes based on new ways of promoting health education. This helps to empower adolescents by enabling them to become active agents in maintaining their health.

The purpose of this study is to test and evaluate the use of a mobile application based on digital counselling aimed at adolescents through safe, easily accessible, private sources of information with all the data they need, so that they have a space that allows them to obtain reliable information, so that in the future they can be responsible in the exercise of their sexuality.

Firstly, the methodology for the design of the app is presented through the different levels of technological maturity according to NASA; secondly, the procedures for carrying out the first tests of the app at the prototype level are presented through an educational intervention based on constructivism; and at the end of the chapter, the results of the test of this technological development are presented in terms of the increase in knowledge in four basic indicators such as: the correct use of contraceptive methods, prevention of HPV and other sexually transmitted infections, use of safe information media and prevention of risky sexual behaviour.

Methodology

A pre-experimental and prospective pilot study was conducted; implemented as an educational intervention in the period from October 2021 to June 2023 in San Luis Potosí, Mexico. Twenty-two students from a public high school selected by non-probabilistic quota sampling participated.

A prototype of a mobile app was developed according to the TRLS methodology (NASA Technology Maturity Levels) (Hobbs et al), which represents a consensual way of measuring the degree of maturity of a technology, ranging from its initial idea to its commercialisation in the market or, in this case, to the stage in which the prototype is obtained to demonstrate the system in a relevant environment (Level 7). Figure No. 1.

Box 1

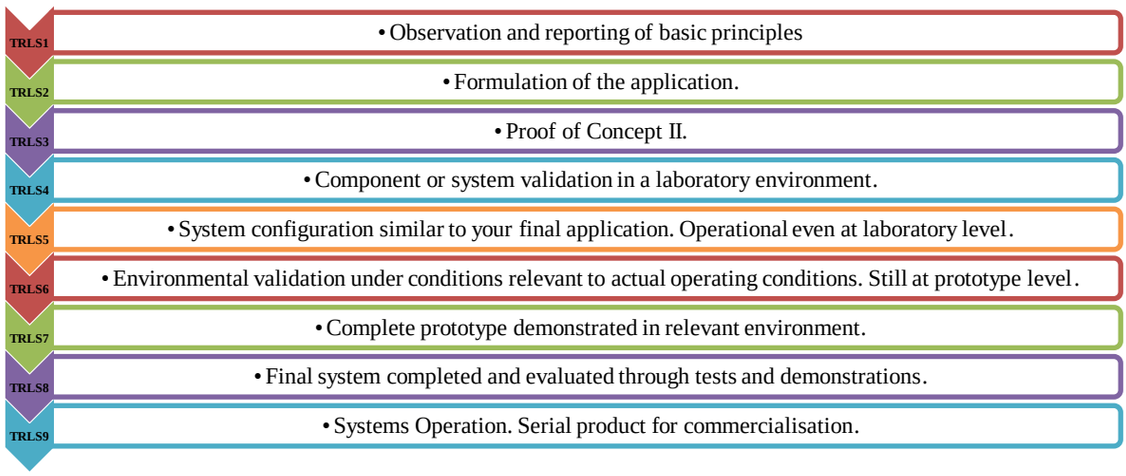

Figure 1

NASA's Technology Maturity Levels

Source: [Information taken from the Ministry of Economy. Technological Innovation Fund of CONAHCYT. Technological maturity stages, according to NASA's "Technology Readiness Level" methodology. Prepared by CONAHCYT's Technology Commercialisation Directorate, February 2015. Original source: Brian Dunbar. Technology Readiness Level [online]. U.S.A: National Aeronautics and Space Administration (NASA)].

Prior to the development of the app, an exhaustive systematic review was carried out, as well as the selection and validation of the contents. Three on-site tests were carried out before testing the prototype in a relevant environment (concept validation, critical and experimental analysis and internal pilot demonstration), the educational materials were designed based on Ausebel's theory of meaningful learning which, according to Matienzo R (2019), is the process in which new knowledge or information is related to the cognitive structure of the learner, in a non-arbitrary and substantive or non-literal way.

The app was presented and tested in a face-to-face manner in conjunction with other activities and implemented in the real environment through an educational intervention that took place in three phases: I).-Pre-intervention or Baseline Measurement, where a first test called "Afrodit-One" was applied, developed by Gutiérrez-Enríquez in 2021, which evaluated four indicators such as knowledge about the prevention of HPV and other sexually transmitted infections (STIs), the correct use of contraceptive methods (MAC), sexual risk behaviours (CSR) and safe means of information (MIS). II) - Intervention or Training, in which they went through the app, read the sections, watched videos, interacted with games and chatted. A series of lectures were given with information about the app and workshops were implemented. III) Post-intervention or final measurement in which the knowledge test and a survey on the experience of using the app were applied again. For data analysis, the parametric t-Student test was applied for paired samples. Informed consent was obtained from the parents of the students who participated in the study. The project was approved by the Ethics Committee of the Faculty of Nursing and Nutrition with registration number CEIFE-2022-417.

Results

In the global evaluation of all knowledge, a mean of 54.48 was obtained pre-intervention and 67.67 post-intervention, with a statistically significant difference (t=-9.12 p=<.001). The indicator with the greatest increase in knowledge was that of risky sexual behaviour, before the intervention the mean was 14.61 and after 22.38 (t=-6.0 p=<.001), followed by the indicator of sexually transmitted infections, before the intervention the mean was 19.14 and after 22.38 (t=-4.69 p=<.001), in contraceptive methods the mean before the intervention was 15.76 and after 18.04 (t=20.7 p=<.001). The indicator in which the least knowledge was obtained was in sources of safe information with a mean of 4.95 before and 4.85 after the intervention (t= -54.3, p=.325, p=.001). (Table 1).

Box 2

Table 1

Statistical scores and t-Student test obtained by students according to subject area

n=22

Knowledge About:	Statistics	Baseline measurement	Measurement final	Difference of Means	Value of t	*p*
Sexually transmitted infections	Media	19.14	22.38	- 3.24	-4.69	<.001
	DE*	1.74	2.55	- 0.81		
	Minimum	15	17	- 2		
	Maximum	22	27	- 5		
Contraceptive methods	Media	15.76	18.04	- 2.28	20.7	<.001
	DE*	2.54	1.11	1.43		
	Minimum	12	15	- 3		
	Maximum	20	20	0		
Risky sexual behaviour	Media	14.61	22.38	- 7.69	-6.00	<.001
	DE*	3.5	2.5	0.7		
	Minimum	12	19	- 7		
	Maximum	19	24	- 5		
Secure sources of information	Media	4.95	4.85	0.1	-54.3	.325
	DE*	.327	.288	0.03		
	Minimum	4	4	0		
	Maximum	5	5	0		
Overall scores	Media	54.48	67.67	-13.19	-9.12	<.001
	DE*	4.00	4.11	- 0.11		
	Minimum	48	58	-10		
	Maximum	62	73	-11		

(*) Standard Deviation

Source: Afrodit-One instrument to assess knowledge of sexual and reproductive education among adolescents.

Students in the first grade of secondary school had the highest post-intervention mean (67.6) compared to students in the second and third grades, who scored 65.0 and 67.0 respectively (Table 2).

Box 3

Table 2

Secondary school students' pre- and post-intervention scores by grade level

n=22

	Pre-intervention	Post-intervención	
Grade level	Media	Media	Difference in averages
First	54.16	67.66	13.5
Second	53.11	65.00	11.8
Third	56.83	67.00	10.1

Source: Afrodit-One tool to assess knowledge of sexual and reproductive health education among adolescents.

Most students' perception of the accessibility, structure, design and content of the mobile application was good (85.3%), while 14.7% found it fair and none found it excellent or poor.

Box 4

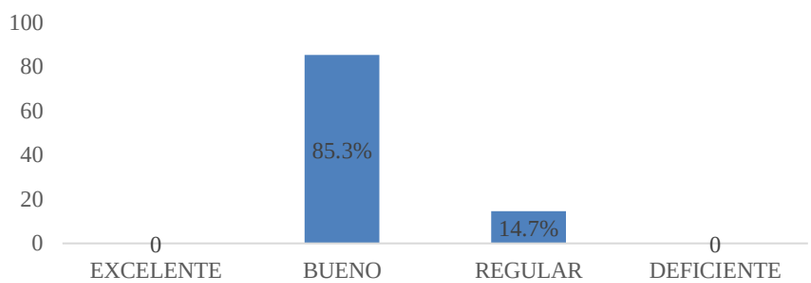

Figure 2

Overall assessment of mobile application usage among secondary school adolescents

Source: Afrodit-One instrument to assess the user experience with the mobile application through user satisfaction.

The source of support for information on sexuality and reproduction that students turn to most often is their mother (57.1%), followed by social networks and the Internet (26.5%), followed by family members (14.2%) and health personnel (2%). Table 3.

Box 5

Table 3

Sources of information on adolescent sexuality and reproduction issues

n=22

Source of support	Frecuency	Porcentage
Mother	12	57.1
Family members	3	14.2
Health personnel	1	2.9
Internet and social networks	5	26.5
Total	21	100

Source: Afrodit-One instrument to assess knowledge of sexual and reproductive education in adolescents

Discussion

WHO (2020) in the draft global strategy on digital health 2020-2025, notes that the 2030 Agenda for Sustainable Development emphasises that the expansion of information and communication technologies and global interconnectedness offer great potential for accelerating human progress, bridging the digital divide and developing knowledge societies.

According to León-Castañeda and Christian Díaz de. (2019), the evolution of mobile communication technologies such as smartphones and wearable devices (*wearables*, such as bracelets, watches or other accessories) enables the monitoring of activities (physical exercise) or health conditions for individuals and the monitoring of these conditions and lifestyles by healthcare professionals towards decision making. These devices are increasingly applied in various fields and make up the so-called mobile health (m-Health or m-Health).

From a public health perspective, these devices represent opportunities to intervene with the general population in health promotion or to collect information related to habits, behaviours or lifestyles of the population, which constitutes an opportunity to issue possible health risk alerts that can generate timely interventions for epidemiological surveillance systems.

On the other hand, the Mexican Official Standard (NOM 039-SSA2-2014) for the prevention and control of sexually transmitted infections establishes the criteria to be implemented in terms of prevention and control of sexually transmitted infections throughout the national territory, hence some of its recommendations are aimed at prevention through the maintenance of information provided to the population regarding the routes and mechanisms of transmission, forms of prevention and information services, detection and comprehensive care related to STIs, in addition to inviting the population to avoid risky sexual behaviour. In terms of education, it indicates that educational programmes should be developed that integrate the topics of STIs and their prevention so that people adopt preventive behaviours and healthy lifestyles in favour of the prevention and control of STIs in the country.

Studies such as Mederos Villalón et al (2019) and Palacios Gálvez et al (2020) provide a first approximation between health and technology in adolescents and to what extent electronic devices, games, social networks or mobile applications can play a relevant role in promoting healthy lifestyles. Another study carried out in Spain by Carrion et al in 2016, where mobile phones were used to measure the perception of adolescents and their parents regarding the promotion of healthy habits, shows that both adolescents and adults consider that technology can contribute to improving lifestyle habits and improving their self-esteem. The above has a point of coincidence with the present study, since it was identified that the sources of support to which adolescents turn to ask questions regarding sexuality issues, in the first place, is their mother and their second source of support is found in the use of social networks.

In this study, a significant increase was observed in knowledge about the prevention of sexually transmitted infections, risky sexual behaviour, contraceptive methods, as well as safe means or sources of information, showing significant learning, which coincides with a study on significant learning and its role in the social and cognitive development of adolescents, by Moriera (2019) in which it is pointed out that, according to this type of learning, new knowledge is incorporated in a substantive way into the student's previous cognitive structure, this is achieved when the student relates the new knowledge to previously acquired knowledge; But it is also necessary to interest the student in learning what he/she is being shown, thus bringing together the motivations of the teacher and the student to efficiently and effectively carry out the teaching-learning process. ICTs are therefore good tools for learning, as students can develop other skills through new ways of transmitting, processing and using information.

Most of the students were satisfied and had a good experience with the use of the mobile application, which was tested in a relevant environment and achieved a level 7 (NASA Technology Readiness Level), making it ready to progress to levels 8 (Final system completed and evaluated through testing and demonstration) and 9 (System Operation with a serial product for commercialisation).

Conclusions

The prototype of a freely distributed Android mobile application for promoting sexual health-related content available to adolescents was successfully tested. The implementation of the educational intervention was effective, as it provided participants with experience in improving knowledge of sexually transmitted infections and contraceptive methods. Its main focus is on responding to the information and knowledge needs provided through interactive and playful reading. It is necessary to encourage the creation of tools and content that address the promotion of sexual and reproductive health among the general population.

Declarations

Conflict of interest

The authors declare that there were no conflicts of interest in the execution of this work.

Authors' contributions

Gutiérrez-Enríquez, Sandra O: original project idea, design of the mobile app, project management, supervision of methods and techniques, and correction of the manuscript.

Rivera-Gómez, Jessica M: drafting of the manuscript, execution of the project, corrections to the manuscript.

Terán-Figueroa, Yolanda: correction of the manuscript and supervision of style:

Acuña-Aradillas, Jorge Martín: collaboration in the design, implementation and control of the mobile app.

Availability of data and materials

All data and bases are available.

Funding

The study was funded by the Faculty of Nursing and Nutrition of the Autonomous University of San Luis Potosí. Mexico.

Acknowledgements

To the authorities of the participating institution and to the students who collaborated in the project.

References

Background

Güemes-Hidalgo, M.J. Ceñal González-Fierro, M.I. Hidalgo Vicario.(2017). Desarrollo durante la adolescencia. aspectos físicos, psicológicos y sociales. Pediatr Integral; XXI (4): 233-244.

Fandos-Garrido M. (2003). Tesis. Formación basada en las Tecnologías de la Información y Comunicación: Análisis didáctico del proceso de enseñanza aprendizaje.2003. Consultado en [Internet] el día 15 de febrero de 2022.

Universidad de Salamanca. Aplicaciones móviles útiles para la vida cotidiana y la salud Consultado en [Internet] el día 28 de Junio de 2024.

Alonso-Arévalo J., Mirón-Canelo JA. (2017). Aplicaciones móviles en salud: potencial, normativa de seguridad y regulación, Revista Cubana de Información en Ciencias de la Salud.Consultado en [Internet] el día 28 de Junio de 2024.

Basic or fundamental

Encuesta Nacional de Salud y Nutrición 2018 ENSANUT Consultado en [internet] el día 3 de abril de 2022

UNFPA, Salud Sexual y Reproductiva en adolescentes y jóvenes. Consultado en [Internet] el día 28 de junio de 2024.

Expansión política, S.A.DE.C.V. Consultado en [Internet] el día 3 de abril de 2022.

Organización Mundial de la Salud, el embarazo en la adolescencia, consultado en [internet] el día 14 de febrero de 2022.

OMS, Boletín de la Organización Mundial de la Salud (2021). Comunicado de prensa. Cada día, más de un millón de personas contraen una infección de transmisión sexual curable. Consultado en [Internet] el día 04 de Julio de 2024.

Organización Mundial de la Salud (2020). Proyecto de Estrategia Mundial sobre Salud Digital 2020-2025. Consultado en [Internet] el día 11 de Julio de 2024.

Norma Oficial Mexicana NOM-039-SSA2-2014, Para la prevención y control de las infecciones de transmisión sexual.

Support

Hobbs, Kerianne L. Lyons Joseph B., Feather Martin S., Bycroft Benjamen P, Phillips Sean, Simon Michelle, Harter Mark, Costello Kenneth, Gawdiak Yuri, Paine Stephen (2022). Space Trusted Autonomy Readiness Levels. The MITRE Corporation.

Matienzo, R. (2020). Evolución de la teoría del aprendizaje significativo y su aplicación en la educación superior. *Dialektika: Revista De Investigación Filosófica Y Teoría Social*, *2*(3), 17–26.

Discussion

León-Castañeda, Christian Díaz de. (2019). Salud electrónica (e-Salud): un marco conceptual de implementación en servicios de salud. *Gaceta médica de México*, *155*(2), 176-183. Epub 01 de julio de 2021.

Mederos Villalón, Lídice, Flechilla, Adriano, Pérez Acuña, Yainerys, Hevia Salgebiel, Amaury, & Ferrer Savigne, Yoire. (2020). Xebra: aplicación móvil para la prevención de las infecciones de trasmisión sexual en adolescentes. 2019. *Revista Cubana de Informática Médica*, *12*(2), . Epub 01 de diciembre de 2020.

Palacios-Gálvez, Mª Soledad, Yot-Domínguez, Carmen, & Merino-Godoy, Ángeles. (2020). Healthy Jeart: promoción de la salud en la adolescencia a través de dispositivos móviles. *Revista Española de Salud Pública*, *94*, 202003010. Epub 02 de noviembre de 2020. Recuperado en 12 de julio de 2024, de

Carrion, Carme, Arroyo Moliner, Liliana, Castell, Conxa, Puigdomènech, Elisa, Gómez, Santiago Felipe, Domingo, Laia, & Espallargues, Mireia. (2016). Utilización del teléfono móvil para el fomento de hábitos saludables en adolescentes. Estudio con grupos focales. *Revista Española de Salud Pública*, *90*, e40022. Epub 07 de junio de 2021. Recuperado en 12 de julio de 2024,

Moreira P. (2019). El aprendizaje significativo y su rol en el desarrollo cognitivo del adolescente. Rehuso,4(2), 1-12.