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The Utilization of MHealth for Assessing Child Safety Education Is A Necessity

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***Abstract*— In the last 10 years, disasters have caused huge casualties that affected the welfare and safety of people and countries. More than 700 thousand people have lost their lives, more than 1.4 million injured and around 23 million have lost homes due to disaster. The impact of disasters on children is far greater than on adults. For this reason, the development of effective instruments is important to increase public awareness and education, especially user-friendly instruments that can be used to assess children's safety education. Instruments will increase an understanding on disaster risk and encourage all stakeholders to be actively involved in reducing multi-hazard risk, especially starts from the school. The method used in this research was a systematic review. The articles were obtained by searching through electronic databases available at EBSCO, PubMed, Science Direct, SAGE Journal, ProQuest and Emerald Insight, which were published in English, between January 2009 and January 2019. Only two of 114 articles met the inclusion criteria; by the research reviewed, there was no very specific research that used m-health to assess child safety education especially at school. Therefore, in the future, it is necessary to develop further research related this issue.**

Keywords— MHealth, safety-education, children.

I. INTRODUCTION

In Indonesia, many accidents occur in children due to children's lack of knowledge on safety aspects. Therefore, safety education is very essential for children, especially elementary school children, where 5 out of 9 students had accidents at school and must be referred to the hospital. Efforts are still needed to increase teacher capacity, integrate safety aspects in curricula, especially on thematic subjects, and extracurricular activities, and also to develop child-friendly educational games that are used for child safety education efforts[1]–[4].

Motor vehicle accident is also a prominent cause for death among children, because most children involved in driving accidents do not meet the safety standards. Most parents did not utilize car seat check professionals due to lack of knowledge. Therefore, transportation safety is included in public health problem in order to attract serious attention towards the problem. However, there are few information available about injury prevention to children, especially through cellular applications even though this is an effective channel for communicating with parents to prevent injury among children. For example, Otto the Auto website is a computer-based interactive education that is effective to teach children about health and safety aspects, including transportation safety for children. In India, cellular technology such as the Portable Eye Examination Kit (Peek) supported cellular technology is also used in the health sector to screen and provide health education. It is used to educate parents, teachers and children about refractive errors and the importance of wearing spectacles and had the potential to increase spectacle usage among children[5]–[8].

There are few studies related to MHealth in the field of safety, research conducted by Larissa Jennings et al. showed that only 7 out of 173 articles met the inclusion criteria. In general, MHealth is currently used in aspects related to HIV/AIDS, sexual and reproductive health, health-based microenterprise, non-communicable diseases, support emergency medical services, online help-seeking, maternal and child healthcare, medical and health education, service delivery and health outcomes[9]–[15]. Therefore, MHealth function needs to be expanded because MHealth interventions delivered through Text Messaging (TM) has the potential to improve healthy life style behaviors in adolescents, such as increasing physical activity. Expansion of MHealth functions can be used to provide education or campaigns, because health campaigns can maintain healthy behavior on a large scale while bringing social change[16]–[18].

Therefore, the research question in this study is to what extent MHealth application can be used to assess child safety education system.

II. METHODS

To investigate to what extent MHealth application can be used to assess child safety education system, we conducted a systematic review. The search was conducted in January 2019.

TABLE I. Search Strategy for Electronic Database

Search Category	MHealth		Safety Education		Children		Assessment Tools
Search keywords	Mobile, mobile phone, online, information technology, mobile device, smartphone, MHealth, Mhealth, mHealth, mhealth, website, telemedicine, mobile health.	AND	Safety, safety education.	AND	Children	AND	Assessment tool(s), evaluation tool(s).

A. Data Sources

The database were obtained from broad scientific disciplines; both public health and social sciences were all considered for review. We utilized six key search engines, such as: EBSCO, PubMed, Science Direct, SAGE Journal, ProQuest and Emerald Insight.

B. Inclusion and Exclusion Criteria

The inclusion criteria in this study were: (i) the study assessed child safety education through MHealth or a mobile phone health, (ii) research articles were limited to English articles published between January 2009 and January 2019 (the past 10 years), (iii) the study was conducted in any country (developed or developing country). Study were excluded if they did not focus on safety education for children (under 18 years old).

C. Search Strategy

We searched literature systematically using terms MHealth AND Safety Education AND Children AND Assessment Tools. A variety of term combination of MHealth were used, such as: mobile, mobile phone, online, information technology, mobile device, smartphone, MHealth, Mhealth, mHealth, mhealth, website, telemedicine, mobile health. Table I shows the search strategy for electronic database.

D. Review Process

Figure 1 reveals the PRISMA flow chart summarizing articles eligibility and selection process. The PRISMA step consists of 4 main activities, namely identification, screening, eligibility and inclusion[19].

In the identification process, database search result identified 114 articles, and there were 13 articles that were successfully traced from other sources, namely from the Book Science Direct Chapter. The next process was removing duplicate articles, leaving 121 articles. During the screening of 121 articles, 92 articles had to be excluded because they did not focus on children, although they were still related to children; for example: parents, child healthcare, guardians, caregivers, etc. After the screening process was completed, it was followed by an eligibility check. Out of the 29 full-texts articles assessed, 27full-texts must be excluded because the articles only had general points on safety aspects but was not specific to safety education. The final process of the PRISMA diagram is the inclusion process where only 2 articles were eligible for qualitative synthesis.

Qualitative study was used in order to explore how health professionals use theories and models from the education field to create ehealth and mhealth education interventions in an effort to develop health promotion initiatives[20]

III. Result and Discussion

After the review process using the PRISMA diagram was carried out, the characteristics of the selected articles can be identified as in Table II.

Nowadays smartphones are commonly used to support learning process because smartphones have advantages of recording availability, portability and can be applied to both formal and informal education. Furthermore, it provides new perspectives on learning and education research. According to Morahan-Martin research, out of all searches on the internet, 4.5% is predicted to be health-related searches; this phenomenon also occurs in America. The messages delivered through telephone providers is low-cost, and has potential positive impact for health promotion program[11]–[13], [21].

Schools are an integral component of children's lives, so the quality of school life is very important and affect the children's life experiences. Furthermore, a tool that can assess the quality of the school is needed so that children can assess their satisfaction on their schools' quality. Unfortunately, most schools do not provide health education to children, teachers or the parents. The quality of a child's performance can be influenced by several aspects, such as teaching quality, school structure and culture, individual and social characteristics. In this context, safety education for children is also needed as an evaluation process, so that the education system can be continually optimized and improved. Safety education must be provided through a variety of channels, because programs such as Safety City are not enough to build the safety culture among children. Therefore, the application of several models of safety education can be included into educational programs [8], [22], [23]

A. Intervention Characteristic and Methodological Rigor

The participant in a study by David C. Schwebel et al were 69 4- and 5-year-old children recruited from schools and other communities in Birmingham, Alabama. No other exclusion criteria beyond child age was applied and the research used pre- and post-intervention assessment. The study conducted by Priya Morjaria used cluster randomized design, double-blind clinical trial of children with and without uncorrected Refractive Errors (uRE) as the standard protocol. Both children and field workers who collected the primary data were blinded. Children were not told that other schools will have different interventions. The trial was conducted in

government middle and secondary schools in urban and rural areas in and around Hyderabad, Telangana State, India.

B. *Effectiveness of Intervention*

Otto as interactive website designed for young children was not able to improve children's knowledge nor behavior in the intervention group compared to control groups related to transportation safety, even though they obtained safer behavior patterns. There were 4 main categories in the results of a study by Priya Morjaria, namely: (1) still wearing glasses during unannounced visit, (2) having glasses at school but not visiting glasses, (3) having glasses at home but did not wear glasses during the visit and (4) not wearing glasses during visit due to damage or loss of glasses.

C. *Challenges in An Intervention*

The challenge in both studies was the need to involve all potential actors integratively, namely targeted children, their peers, teachers, parents and government to support the intervention program, so the program will run more sustainably, because most school do not provide health and safety education in their school.

D. *Quality Control of The Studies*

In the second studies by Priya Morjaria, the team consisted of a program manager, administrator, optometrists, dispensing opticians and field workers. Training, quality assurance and overview of data collection were provided by staff at the International Centre for Eye Health, London School of

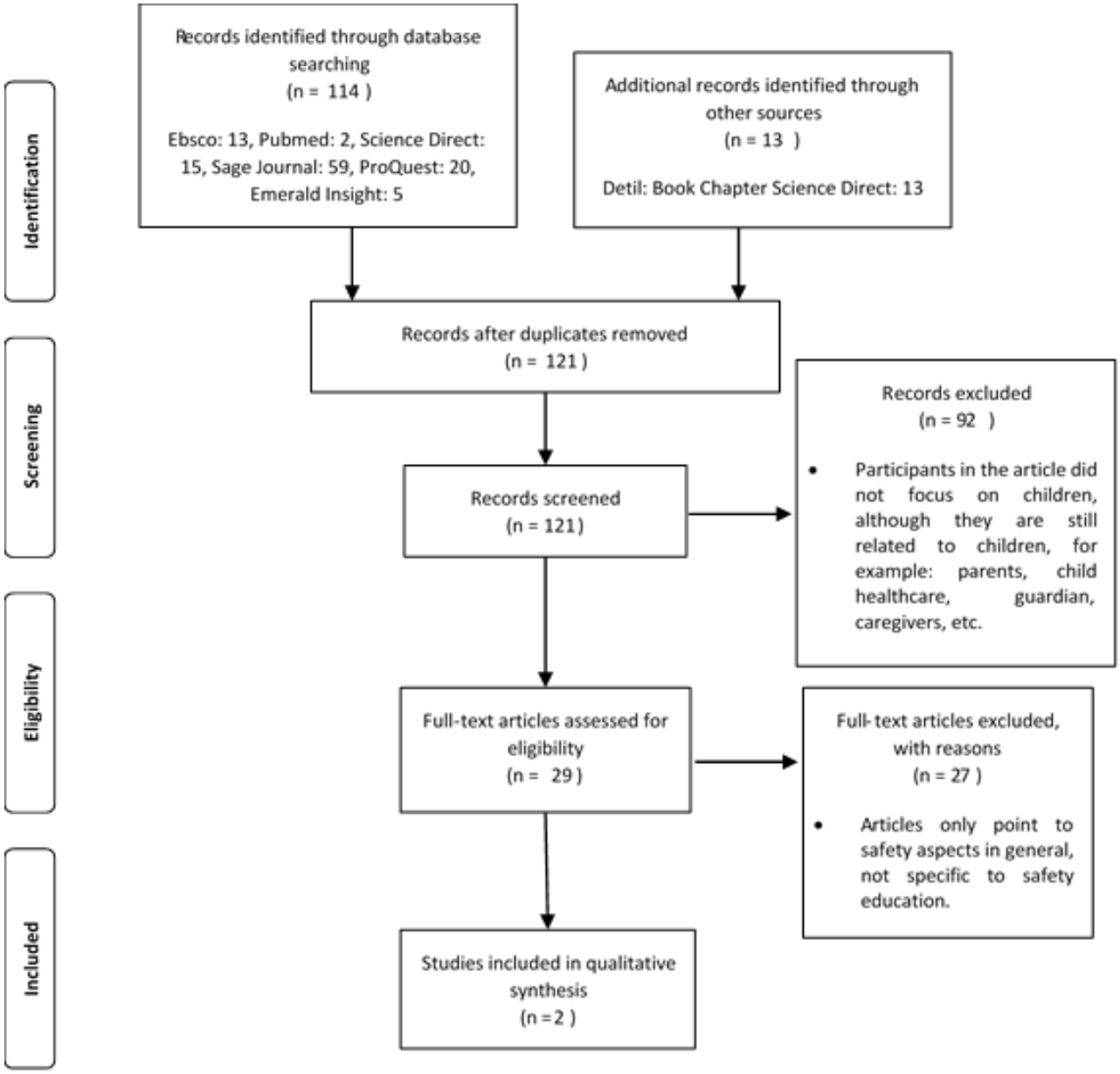

Figure 1. PRISMA flow chart summary

Hygiene & Tropical Medicine (LSHTM). David C. Schwebel et al's research had two laboratory visits for participant. Baseline and post-intervention visits comprised detailed evaluations of children's knowledge and intended behavior in transportation safety. Three steps data analysis process was used: (1) reported website usage, (2) examination of the number of times children used the website, and (3) children's satisfaction when using the website for the first time.

TABLE II. Characteristics of Selected Studies

Author(s) Journal	M-health Intervention	Country	Study's Primary Objectives	Design	Sample	Findings
(1) David C. Schwebel et al International Journal of Environmental Research and Public Health	Using Otto the Auto website, Interactive computer-based health education, as effective tool for teaching children knowledge about transportation safety and to improve their simulated behavior	United States	To evaluate Otto the Auto as a website offering engaging, interactive activities	Randomized parallel group	Children	Otto was successful when children and their parents were involved in it. Provision of transportation safety education to children through the internet was a strategic method
(2) Priya Morjaria et al Trials	Scalable the Portable Eye Examination Kit (Peek) supported cellular technology will be used to screen and provide health education	India	To evaluate health education packages for teachers, parents and children using The Portable Eye Examination Kit	Cluster randomized	Children	Educating parents, teachers and children about refractive errors and the importance of wearing spectacles has the potential to increase spectacle usage among children.

IV. CONCLUSIONS

After 4 steps in PRISMA have been carried out in this study, there were only 2 out of 114 articles that utilize MHealth for safety and health education for children. The first is health education on children's eye health, which was conducted at India. The other was safety education for children, namely the assessment of child safety education on transportation safety, which was conducted at United States.

From the review result, there were few research on safety education for the children, especially evaluation of safety education system for children by the school. Further studies pertaining to this issue is needed.

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