



The Status of Health Literacy in Students Aged 6 to 18 Old Years: A Systematic Review Study

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Abstract

Background: Adolescents and children are a core target population for health literacy (HL) studies and practice. There is limited knowledge regarding the HL skills and abilities that help young people and children in making health decisions. This study aimed to evaluate the status of HL in ongoing school students.

Methods: Literature searching was performed using nine databases (Web of Science, PubMed, Scopus, Google Scholar, Iranmedex, Magiran, Scientific Information Database) without restriction in time until January 2019, and database searches were supplemented with reference hand searches and gray literature. Cross-sectional and experimental studies with focuses on validated measures of HL in ongoing students were included.

Results: This systematic review of identified 17 studies and 199714 samples specifically studied on ongoing school students aged 6-18 years. Students and their mothers have a moderate level of HL in four dimensions of menstrual health, physical activity, breast self-test, and iron deficiency anemia, and most of them have a high level of HL only in terms of nutrition. The relationship of HL with health outcomes, health promotion behaviors, self-efficacy, self-mutilating behaviors, and self-care abilities was statistically significant. HL status is related to parents' education level, socio-economic determinants (culture, family income, and environmental contextual factors), age groups, and media/digital communication channels.

Conclusion: This review identified seven main determinates that significantly affect HL status in the target group. This systematic review shows most of the ongoing school students had an inadequate level of HL skills. HL strategies have a potential impact on improving students' health behaviors and life quality.

Keywords: Public health; Systematic review; Schools, Children; Adolescent; Health literacy

Introduction

Health literacy (HL) is defined as the ability of individuals to acquire, read, understand, and use healthcare information, and treatment guidelines for making appropriate health decisions (1, 2). Low HL is considered to be a silent health epidemic (3). Low HL is associated with poor utili-

zation of healthcare services, higher hospitalization rates, and ultimately poor and undesirable health outcomes (4-7).

Acquisition of knowledge is a process whose learning is started from childhood. HL bases, health behaviors, and common welfare are



formed in childhood and school years (8-10). One of the main goals of the school is to reduce inequalities among students. Education helps the health and welfare of students in the public domain, and HL is one of the things that can help reduce inequalities (11). Improvement in HL can also help to achieve better health outcomes for school-age students (12-14). Students are one of the most important target groups in the community, and school is one of the most important places in which students spent a long time of their life, develop their health attitudes and behaviors. School hours are the best time for individuals to learn, so the development of health skills and behaviors during this period can help them grow healthy and increase their physical and emotional health during adulthood (15-18).

Low HL is associated with lower general health, unhealthy diet, weight gain, greater involvement in high-risk behaviors, and the use of drugs in high school (19-21). Students had no adequate HL and low HL could reduce their quality of life. High HL was also associated with physiological welfare, mental welfare, social welfare, and puberty health of students (3, 22, 23). The results of a study on Chinese students showed that there is a relationship between low level of HL and self-harm behavior in students, and low HL with psychological symptoms is associated with an increase in the line of self-harm (24). Only 16.4% of students had a satisfactory level of mental health, and most of the students did not have a proper status (25).

About Iranian students, the level of HL among students was less than optimal and there was a relationship between HL and health improvement behaviors, and HL was a good predictor for performing health improvement behaviors among students (26, 27). Most of the students are not in a proper situation in terms of HL status (28). Regarding the important role of HL in student development and growth, this systematic study aimed to 1) determine the current status of HL in schools; 2) examine effective factors in the HL of school students and; 3) understand how much HL affects the personality traits and behav-

iors of these students (as children and adolescents).

Methods

We planned a systematic review based on the preferred reporting items for systematic reviews (PRISMA) (29). We addressed the following research question using review techniques: (a) what is the HL status of students 6 to 18 yr old? (b) which factors are effective to improve HL among students? and (c) does HL affect personality characteristic and student behaviors?

Search strategy

In this review, several electronic databases including the Web of Science (ISI), PubMed, Scopus, Google scholar, and Persian database (Scientific Information Database (SID), Iranmedex, and Magiran) were searched without restriction in time until January 2019. The Medical subject heading (MeSH) thesaurus and 5 keywords (health, school, children, adolescent, teen) combined with Boolean operators with the term HL. We included all scientific surveys in full-text format, published in the indexed scientific database in this study to increase the accuracy of the review.

Article selections and Screening

Articles were included for inclusion criteria if they were: (a) published in English and Persian language, (b) cross-sectional, case-control, cohort, and intervention articles, conducted on school children and adolescents (ages 6-18 yr old), (c) reported the status HL, (d) published in full text, and (e) designed based on a valid and reliable instrument to measure HL. Articles were excluded if they were: (a) not reported HL status, (b) qualitative study, (c) published as editorials comments, reviews, book chapter, letter, conference, abstracts, or presentations, and (d) were not published full-text articles. Two authors conducted the initial search and independently screened the title, abstract, and full text of retrieved articles. Then, we selected articles, which meet the

inclusion criteria. Both reviewers were in 100% agreement overall included articles and extracted data. Furthermore, the third authors resolved any doubts and discrepancies regarding the included articles.

Data extraction and quality appraisal

The content independent data extraction was conducted to extract the following characteristics from all included studies: 1. the publication year/author(s), type of publication, city, study design and type, aims, participant characteristics, and sample size; 2. HL and health outcomes

scores; and 3. methodological approach, setting, type of instruments used to measure HL (Table 1). All disagreements regarding included articles were examined by discussion among authors and the independent dual rating was also conducted to measure the quality of eligible studies (30). We followed all recommendations in the STROBE checklist to examine the quality of non-randomized intervention and cross-sectional studies. The quality of all studies was good with an average score of 0.63. This is acceptable quality consistent with the STROBE checklist.

Table 1: Characteristics and information related to studies on health literacy (HL) in school children

<i>Author's name</i>	<i>Study purpose</i>	<i>Type of study</i>	<i>Sample size</i>	<i>Tool</i>	<i>Result</i>
Zhang(24)	To estimate the relationship between low HL and mental health with self-harming behaviors in Chinese high school students.	Cross-sectional study	25378	CAIHLQ	38% of people with inadequate HL, 28.6% had moderate HL and only 17% had adequate HL level. Low HL is significantly related to self-harming behaviors (other than suicide). Low HL and psychological symptoms were independently and interactive with an increased risk of self-harm.
Ran(3)	To assess the relationship between HL and quality of life in high school students.	Cross-sectional study	1774	A self-administered questionnaire	25.54% had a low level of HL, 48.25% moderate, and only 21.26% had a sufficient level. There was a correlation between the variables of age, educational grade, family structure, and other variables with the level of HL. Generally, students with higher HL also had a better quality of life, physiological well-being, mental well-being, social well-being, and puberty health
Park(19)	To investigate the HL status and its relation with healthy behaviors in adolescents	Prospective study	250	The Newest Vital Sign (NVS) health literacy	33% of adolescents had inadequate HL, 45% borderline, and only 23% had a good level of HL. Lower basic HL was associated with lower self-assessment of general health, inappropriate diet, increased overweight, and increased participation in suspected behaviors and sexual behaviors .Lower basic HL was associated with increased drug intake over time.
Khajouei(28)	To determine the HL status of high school students.	Cross-sectional study	312	TOFHLA	85.25% of students had inadequate health literacy and only 14.75% had adequate health literacy. There was a significant relationship between sex and level of health literacy and the level of health literacy in girls was higher than that of boys. Moreover, there was a significant relationship between health literacy with the type of school, family income, and parental education level.

Lam(25)	To determine the relationship between mental HL and mental health status, high school students.	Cross-sectional study	1678	MHL	83.6% of students had an inadequate level of mental HL and only 16.4% of students had a satisfactory level of mental HL. There was a significant relationship between mental HL level and person's mental status.
Shih(35)	To assess the relationship between HL and body weight in 6th grade students in Taiwan	Population-based survey	162209	The Taiwan Child Health Literacy test	27% of students with an inadequate HL level and only 16% of students had an adequate level of HL. There is a relationship between the level of HL and the rate of obesity among students who had high levels of HL 12%, and among those with lower levels of HL literacy, 17% had obesity.
Ismail(39)	To assess the oral health of parents and its relationship with the oral health condition of pre-school children in Malaysia.	Cross-sectional study	200	Rapid Estimation of Adult Literacy in Dentistry 99 words version (REALD-99)	28% and 72% of parents had inadequate and sufficient HL levels respectively. There was a relationship between the level of parental HL and the average child dmft reduction with the increase in the level of parental HL.
Chari(32)	To determine the relationship between HL and obesity in children and adolescents	Cross-sectional study	239	The Newest Vital Sign health literacy(NVS)	In the ages 7-11, 50%, 42.53%, and 8% of children has inadequate HL levels, moderate and excellent. In the 12-19 age group, 14.28%, 52.38% and 33.33% had inadequate, moderate, and high levels of HL respectively. Childhood obesity in the school was associated with parental HL. The results showed that adolescent obesity is strongly associated with adolescent's functional HL.
Vongxay(36)	To measure sexual and reproductive HL among school-going adolescents and to determine factors associated with sexual and reproductive HL.	Cross-sectional study	461	Self-administered structured questionnaire	65.5%, 27.9%, 6.5%, and 1.1% of adolescents had inadequate, borderline, adequate, and excellent HL levels regarding sexual health and pregnancy, respectively. There was no significant relationship between sex with HL. There was a significant relationship between residence and HL level. There was a significant relationship between Internet access and the high level of HL.
Rocha(33)	To investigate the association between functional HL and socio-demographic factors, quality of life, self-perception of health, and perception of contexts of violence in adolescents	Cross-sectional	384	Self-administered questionnaire (questionnaire on functional health literacy)	48.43% and 51.56% of students had inadequate and sufficient HL levels respectively. There was no significant relationship between sex and educational variables with the level of HL. There was a significant relationship between HL with dimensions of quality of life (physical, emotional, social, and educational), and increasing the level of HL increases the quality of life in adolescents.
Shabi(34)	To determine the HL and Internet Health Information among school Adolescents in Osun State, South-West, Nigeria	Cross-sectional	1200	Adolescent Media, Health Literacy and Internet Health Information Utilization	3.3%, 59% and 37.7 % of students have poor, intermediate, and appropriate HL levels respectively. There was a significant relationship between the level of HL skills and the use of health information on the Internet, and those who have HL skills are looking for more information about health.

Paakkari(8)	To investigate Finnish adolescents' subjective HL in association to school achievement, learning difficulties, educational aspirations, and family affluence	Cross-sectional	3833	Brief HLSAC	33% of students had a high level of literacy. The level of HL in girls was significantly higher than that of boys.
Ajam(31)	To determine the HL status of high school students in Gonabad	Cross-sectional study	351	HELIA	The mean (standard deviation) of the total HL score was 77.11 (17.41) out of 100. The results showed that there was a significant difference between the level of HL among male and female students, and the mean HL of boys was higher than that of girls.
Aghamolaei(26)	To determine the status of HL and its relationship with health promoting behaviors in students	Cross-sectional study	400	HELIA	Mean scores of health promotion and HL behaviors were 64.5 and 68.9 in boys and 57.6 and 67.9 (out of 100) in girls respectively, and this difference was significant in promoting health behaviors between boys and girls. Also, the results of regression analysis indicated that 41% of changes in health promotion behaviors are explained by HL.
SaeediKoupai(40)	To assess the HL of high school girls and their mothers about the health of women in Isfahan.	Cross-sectional study	200	Health literacy among females	30% of students and 40 %of mothers of their schoolchildren had poor HL in menstrual health, and only in the nutrition dimension, 77% of girls and 77.5% of their mothers have high health literacy.
Saeedi(37)	To examines the relationship between HL and body mass index in adolescents	Cross-sectional study	400	HELMA	37.5% of student (n=150) had inadequate HL, 37% (n=148) had not enough HL, 5.22% (n=90) had good HL and 3% (n=12) had excellent HL. There was no significant correlation between HL and body mass index.
Olyani(38)	To assess the HL of high school students and their relationship with using mobile phones.	Cross-sectional study	445	The Newest Vital Sign (NVS)	49% of adolescents had not adequate HL. 33% of girls and 37% of boys had limited HL. Also, 18 percent of girls and 14 percent of boys also had a good level of HL. There was a negative correlation between the level of adolescent HL and the use of mobile phones

Results

Search Outcome

Overall, 1284 publications were identified until 2019 without time limitation: 621 from Google scholar, 221 from Scopus, 88 from PubMed, 215 from the web of science, 31 from Scientific Information Database (SID), 37 from Iranmedex, and 71 from Magiran. First, duplicate papers were deleted (n=710), then papers were screened

based on title and abstract, and 316 articles that did not meet the inclusion criteria were excluded from the study. Based on the inclusion criteria, 17 potential publications with information on the HL level of 199714 students aged 6 to 18 yr old were included in this review (Fig. 1).

Thirteen studies (76.48%) examined HL practices using health improvement behaviors (3, 8, 19, 26, 28, 31-38), one article (5.88%) assessed HL practice based on oral and dental HL (39), and

two articles (11.76%) investigation Mental health literacy in students (24, 25). Likewise, one study (5.88%) was done on females HL (40). In these studies, the most used questionnaires were the

NVS questionnaire (19, 32, 38), self-made questionnaire (3, 33, 36), and HELIA questionnaire (26, 31).

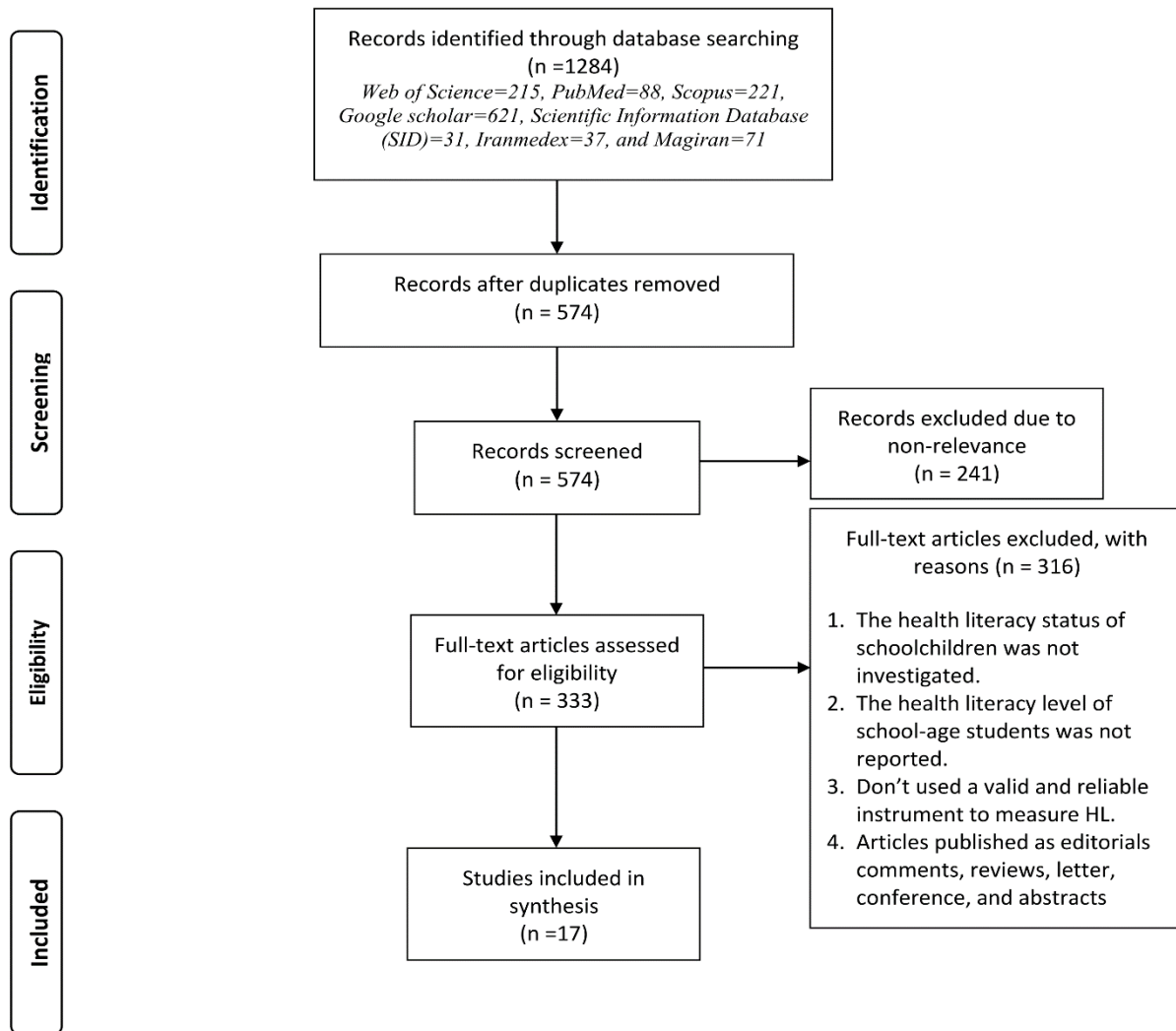


Fig. 1: Flowchart of the systematic review based on the PRISMA checklist

Health literacy among females

In a cross-sectional study, to assess the HL level of students and their mothers, a moderate level of HL was observed into four dimensions of menstrual health, physical activity, breast self-test, and iron deficiency anemia, and most of their girls and their mothers have a high level of HL only in terms of nutrition (40).

Health improving behaviors

There is a significant relationship between HL and self-care behaviors among students, and increasing the level of HL increases health-improving behaviors. HL predicts 41% of changes in health improvement behaviors (26). Saeedi's study on the relationship between HL and Body Mass Index in adolescents showed that 37.5% (n=150) had inadequate HL, 37% (n=148) did

not have satisfactory HL, 22.2% (n=90) had desirable HL and 3% (n=12) had excellent HL (37). In the research on high school students, 82.1% and 86.2% of girls and boys did not have enough literacy, respectively. There was also a negative correlation between the level of adolescent HL and the use of mobile phones (38). Zhang's study on adolescents aimed to examine the independent and reciprocal relationship between low HL and mental health with self-harming behaviors (other than suicide). Low HL is significantly related to self-harming behaviors (other than suicide). Psychological symptoms had a significant positive correlation with self-harming behaviors. Low HL and psychological symptoms were independently and interactively associated with an increased risk of self-harming behaviors (24).

A cross-sectional study on the relationship between HL and the quality of life of high school students showed that 25.5% of the subjects had a low level of HL. Students with higher HL had a better quality of life, and in subscales, physiological welfare, mental welfare, social health, and puberty health had a good status than other students (3). There is a significant statistical relationship between HL with dimensions of quality of life (physical, emotional, social, and educational) (33).

A study aimed at assessing the HL status and its relationship with healthy adolescent behaviors. Lower basic HL was related to lower self-assessment of general health, inappropriate diet, increased overweight and greater participation in suspected behaviors and sexual behaviors. Low HL level was also associated with increased drug intake over time (19).

Khajouei's study on high school students showed that most students had not a suitable level of HL. There was a relationship between the level of HL and the degree of obesity of students, and 12% of students with a high level of HL, and 17% of those with a low level of HL were obese (35). Childhood obesity in the school was more related to parental obesity and parental HL. Adolescent obesity was strongly correlated with functional HL in teenagers (32). In the study of Paakkari, only 33% of students had a good level of HL (7).

There was a positive and significant relationship between the students' HL and their compassion; and the sub-components of compassion human commonalities and intelligence are significant predictors for HL variation (31). Only 37.7% of students had a satisfactory level of HL skills (34). 65.5% of adolescents do not have a good HL level about sexual health and pregnancy (36).

Mental health literacy

Lam et al. aimed to examine the relationship between HL and body weight in 6th-grade students in Taiwan. Only 16.4% of students had a good level of mental HL and most of the students did not have a good status. Likewise, a significant correlation was found between the level of mental HL and the person's mental status, and increasing the level of HL lead to improve the psychological status of students (25).

Oral and dental health literacy

In a study aimed at assessing the parents' oral health and its relationship with the oral health status of preschool children in Malaysia. There was a correlation between the level of parents' HL and the reduction in the mean of DMFT children and the status of children's oral health could be improved with the increasing the health level of their parent (39).

Discussion

Studies included in the systematic review showed that 17 studies assessed HL level, 14 studies reported that most students had inadequate or marginal HL (3, 8, 19, 24, 25, 28, 32-39). From a public health perspective, such an HL score is not sufficient for students aged 6-18 yr (as children and young people) to make informed decisions that promote their quality of life. This stage of life is considered as a crucial and core target stage for HL research and intervention because of the developing healthy process (physical and emotional processes), fundamental cognitive abilities, health promotion behaviors, and skills (15, 16). Given the low HL level in this study, conducting HL interventions is essential to reduce

future health risks in children and young students.

Regarding the second research question, HL status is related to more contexts of daily life. Our finding showed that these differences in HL were observed according to parents' education level (3, 28, 32, 39, 40), socio-economic determinants (culture, family income, and environmental contextual factors) (3, 17, 28, 31, 33, 36), age groups, media and digital communication channels (23, 34, 36, 38). Consistent with the literature, this review confirms that low parents' education is associated with low HL. Most articles in this review highlighted a strong effect of parents' education levels on children's health status (3, 28, 32, 39, 40). Low educated parents can potentially affect the understanding of a child's treatment and diagnosis course.

Further, children and young people are especially dependent upon their parents for access to social and financial resources (15, 16). Furthermore, the role of available socio-economic support structures for the HL of the young student. A student who lives in suitable socio-economic conditions benefit from the HL related skills and knowledge because of easy access to their social formal or informal support structures (3, 17, 28, 31, 33, 36). Overall, these socio-economic factors are mainly argued to act as mediators for HL and tend to be omitted at the core of HL itself (16, 41). As a result, there is a gap between the identification of the role of cultural factors for HL and their implementation within skill-based conceptualizations, operationalization, and strongly individualistic that focus on a few specified HL dimensions (16). Further studies are required that shift from a skill-based HL (functional) to the alternative method of understanding HL, e.g. by evaluating HL within the environmental context that it takes place through the cultural and socio-economic social practices.

Following the literature, a trend showed that older age students had significantly higher HL compared with lower age groups (34, 36, 38). Older student-related HL increase primarily occurs with skills requiring crystallized cognitive and fluid cognitive abilities. It could be that higher degrees

of cognitive abilities influence HL skills. Likewise, other factors such as practice, communication, media, and cognitive reserve may help to increase HL in older students (34, 36, 38). Some articles in this review point out the potential effect of the internet on promoting students' HL status (34, 36). However, Olyani et al. reported the negative effect of mobile on HL status among children and young population (38). The critical role of digital and media communication channels for the children and young people was an issue found to remain underlined in available HL dimensions. More studies highlighted the role of media in the development of children's' emotional, cognitive ability, and personality (16, 34, 36). It transports cultural and moral themes and facilitates their political and social socialization processes (15, 16). Given the important role of digital and media communication channels in children and young peoples, a media HL model for the target group was successfully developed as including a skill set of reflection, discrimination, reflection, interpretation abilities, and empowerment citizenship (16). Therefore, we recommend examining the linkages between HL and digital media in future educational interventions and models.

We found that HL status in students has a potential impact on their health outcome, health promotion behaviors (physical activity, healthy nutrition, responsibility, and spiritual wellness) (24-26, 31, 39), self-efficacy (26, 31, 42), self-mutilating and harmful behaviors (19, 24, 36), mental health (19, 25), and BMI (19, 27, 32, 35). Studies included in this review indicated that the appropriate level of HL help to improve basic or functional health-related skills and materials, and enabling students to better understand and act on the need for health promotion behaviors. Most authors point out the HL skills (numeracy skills and active listening skills) as functional literacy, required to function effectively in everyday situations (24-26, 31, 39).

Regarding the main strength of our finding, this study is one of the first to understand to what extent HL influence the characteristics and behaviors of students as children and young popu-

lation. In the study, most of the young populations are categorized in a moderate or low level of HL. According to current data, the implementation, and education of parents and the student is necessary to reduce the strain and shortage of health outcomes, provide better management, and care for this population. Further, our founding has documented the relationships between main covariates such as parents' education level, socio-economic determinants, and the media. This is important for successful investigation because several factors affect student health outcomes and their quality of life.

Limitation

Although we tried to include all eligible studies based on our review objective, there is a possibility some studies were lost unintentionally. We tried to classified the studies based HL instrument, owing to the multiples instrument used to estimated HL status, we cannot able to determine which instrument was more effective to examine HL status in students. Likewise, identified HL scores and instruments are very heterogeneous, depicting HL as a complex and multi-dimensional construct (16, 41, 43). Further, based on literature include in this review, most of the identified impact of HL on the student was fairly the same as those identified for adults (15, 16). This poor connection of life stage characteristics could result from the fact that their perspectives and voices remain unheard. Our results showed that their active participation in the health promotion studies based specific HL model was only observed in three cross-sectional studies and on an experimental study. Overlaps to adult studies were realized most strongly in health education studies that focused on a life course perspective of HL (16, 41, 44). Thus, their validity and applicability for this subject were observed to be questionable. This is particularly problematic when they have considered a conceptual basis for HL education intervention or programs for children and young students. Applying general HL models to this population not specially designed

to meet the demands and needs of children and the young student could prevent effective HL development and promotion in this group. Therefore, future empirical and conceptual efforts require examining children's and young student's special characteristics and motivating them to participate actively with their understandings of HL and to the promotion of healthy behavior.

Conclusion

This systematic review shows most of the ongoing school students had an inadequate level of HL skills. Studies included in this review stated that HL status in the target group might be affected by parents' education level, socio-economic determinants, age-groups, and media and digital communication channels. Our finding explained why some students experience difficulty in understanding and acting in health-related skills and materials. HL status has a potential impact on improving student's health outcomes, health promotion behaviors, self-efficacy, self-mutilating and harmful behaviors, and self-care abilities. The implications of this systematic review would be useful for health educators and health policy marker to understand the HL status of ongoing school student as well as the insight that affect their HL status.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

The authors declare that there is no conflict of interests.

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