

**Table S1.** Studies for HL Measures and HL Levels for School Adolescents

References	Study Design Setting	Scoring /Measurement Method	Objective/RQ	Sample	Competencies	Reliability/ Time of the Study	HL Level	Differences in the HL Level
Paakkari et al (29)	Cross-sectional  Finland	HLSAC subjective, categorical score (Low, fair, and high) self-rated	To examine associations between structural stratifies	3833 students of 13-15 years from 539 schools	10-item theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship.	The entire spring 2014	The total sample mean score for HL was 32.72	-
Riiser et al (30)	Cross-sectional  Junior high school children and adolescents 8-18 years of age in Norway	HLSAC	To describe HL, health-protective measures, and HR-QOL	2,205 snowball 2,205 adolescents 16-19 years of age	Generic 10-ifocus on functional, mental/social aspects of well-being as mentioned above.	Cronbach's alpha 0.86 weeks 15 and 16 of 2020	The total sample means score for HL was 35.2.	Participants with high parental education, compared to low parental education, had slightly different HL scores.
Paakkari et al (31)	Cross-sectional school-aged children in Finland	HLSAC	To compare HL among adolescents involved and not involved in the sports club activities.	3852 aged 13 and 15	As mentioned above	Spring of 2014.	Perceived HL was higher among young who participated in sports club activities	One-third of non-members and two-fifths of members reported a high level of HL.
Intarakamhang and Intarakamhang (41)	Cross-sectional  School students in all parts of Thailand	HL Scale for Thai childhood overweight	To develop an HL scale for Thai childhood overweight	2000 stratified random	65 questions, (10 Functional; Knowledge, information and service = 5, interaction skills = 6, managing health condition = 5, media literacy = 5, health decision = 4, and preventive behavior of obesity = 20)	0.70 up  2013/2014	Most had a low level of HL (64.4%), while the others had a fair (38.3%) and high (1.3%) level	Most had low interactive (57.8%) and critical HL (72.2%) levels. Only 1.2% had perfect critical health literate; 26.6% had a fair level of critical HL.
Brandt et al (25)	Cross-sectional School adolescent Austria	European HL Survey Comprehensive Scale (three-category: Easy, difficult, and do not know)	examined overall HL	5614 Cluster probability age 11-18 years	16-item finding, understanding, appraising, and applying	Convergent validity assessed average variance extracted ¼ 0.386 and composite reliability. ¼ 0.903 for the one-factor solution	Overall HL scale good model fit (i.e., availability of health-related information may be insufficient)	Three subscales of HL finding, ' understanding and appraising, ' and applying health-related information had a better model fit as compared to the one-factor solution.
Ran et al (26)	Cross-sectional junior middle schools in China	To explore the relationship between QOL and different levels of HL	Wang Lingyi et al's subjective HL scale	1832 multistage cluster of 32 school students	50-item five-point Likert-type scale, 3 core dimensions, functionality,	0.948 test-retest reliability- 0.840.	High = 25.5%, medium = 48.3%, and low = 26.2%. The prevalence of low HL among	When controlling for age, grade, family structure, and

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			low literacy (scores of $\leq 183$ , 1st quartile), medium $> 183$ and $< 210$ , 2nd quartile), and high (scores of $\geq 210$ , 3rd/4th quartile)		interactivity, and critical evaluation	November and December 2016	junior middle school students in the Chongqing area was relatively high.	other covariates, the highest discrimination was found among participants with low to high HL.
Valerio et al (27)	Cross-sectional 44 new work high school Hispanic and African American/Black Caribbean Black adolescents, US	to characterize health-related literacy	Rapid Estimate of Adolescent Literacy in Medicine (REALM-Teen) FHL	327 aged 1-18 years	-	-	69% of respondents scored below grade level, with a mean REALM-Teen score of 55.93 (SD=9.17).	Caste, US citizenship, and gender were all strongly correlated with REALM-Teen scores.
Sukys et al (32)	Survey design  17th-10 <sup>th</sup> grade students of general schools in the US	HLSAC	to determine the level of subjective health literacy among adolescents in Lithuania	2369 clustered aged 13–16 years	10 items	0.88.	Low; 12.1%, moderate; 70.5%, high; 17.4%	Girls had a significantly higher HL mean score than boys.
Valerio et al (42)	Secondary RCT web-based intervention students grades 9-12 six high schools, the USA	HL screening instrument developed by Chew et al	To assess HL among the participant	Control group trial (n=181), 2 <sup>nd</sup> trial (218) aged 15-19	Three-item Likert-type scale response choices scored from 0 to 4	2006-2010	23% had inadequate HL	Inadequate HL score associated with younger, in 9th grade, not medicated.
Paakkari et al (33)	Survey design  four European countries	HLSAC	To examine the cross-national measurement invariance	1468 (690 aged 13; Finland = 176, Poland = 341, Slovakia = 173). 778 aged 15; Finland = 175, Poland = 301, Slovakia = 118, Belgium = 184).	10-item theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship), each component being tapped by two items	0.83 (Finland = 0.90, Poland = 0.85, Slovakia = 0.80, Belgium = 0.81).  2016	The total HL mean score was 31.02. The highest mean score was found in Finland, while the lowest was found in Belgium. The HL mean score was higher among pupils aged 15 than among those aged 13.	A comparison of the mean values for 13 and 15 year-olds across the countries revealed significant differences between the countries. Poland and Slovakia showed no difference from Belgium.
Paakkari et al (34)	Survey  10 European countries	HLSAC	To identify the current state of HL within and between countries.	14,590 15-year-old pupils boys:7087, girls:7503	Ten-item theoretical knowledge, practical knowledge or skills, critical thinking, self-awareness, and citizenship	.85  2017-2018	Low = 13%, moderate = 67%, and high = 20%. The differences between and within	Statistically significant differences between countries. Macedonia

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							the countries were significant.	and Finland had the highest mean scores. Low HL in Czechia (17.7%) and least common in Macedonia (6.0%). Most had a moderate HL, in each country, substantial proportions with low HL.
Ozturk and Ayaz-Alkaya (35)	Cross-sectional/correlational  Three different secondary schools selected from high-, middle-, and low-income levels in Turkey	HLSAC	What is the level of HL in adolescent	2498 6th-, 7 <sup>th</sup> -, and 8th-grade students	10 items	.82  Between April 2019 and May 2019.	The mean score HL scale was 30.26. Overall, 64%, 18.4%, and 17.7% of the students had moderate, low, and high HL levels, respectively.	HL mean scores of students in a region with a high-income, 6 <sup>th</sup> grade, + parents with a graduate degree and a chronic disease were significantly higher ( $P < 0.005$ ).
Hughes and Maiden (43)	Pre- and post-test intervention Delaware high Schools, US	Both pre-test and post-test consisted of the same 17 content questions.	To evaluate teacher satisfaction and student knowledge gain of a health unit developed for adolescents on becoming their healthcare advocates.	948 students in 290-minute classes in 35 classrooms.	Navigating the health care system unit intervention was presented for a 2-day pre-test, modules 1 and 2 were taught on day 1, and modules 3 and 4 were taught on day 2 for post-test	2014-2015 school year	Student knowledge increased from pre-test to post-test.	Students reported they will know indicated support for peers to learn the health information.
Sarhan et al (44)	Cross-sectional household survey  age 11-16years 6th-9th ninth graders of the West Bank, Palestine.	HAS-A-AR: The range of the possible scores for each subscale '0-20'-communication, '0-16'-confusion and '0-24'-FHL	To adapt the HL assessment scale for adolescents (HAS-A) into the Arabic language (HAS-A-AR) and Palestinian context and to investigate its psychometric properties.	1200 sixth to ninth graders stratified random sample	15 items with three competencies (communication, confusion, and FHL) with five scales of 0-4	0.85 The average inter-item correlation for the subscales ranged between 0.36 and 0.59. Conducted in 2017	The proportions of adolescents with high levels of communication, confusion, and fun. Adolescents in this study showed a low level of HL.	HAS-A-AR is a valid and reliable HL measuring instrument
Caldwell and Melton (36)	Descriptive, correlational, and cross-sectional  Texas, the US	NVS FHL 0-1 high (50%) limited HL; 2-3 possible limited 4-6 – Adequate	To describe the influencing factors of AHL	105  Convenience	6-item test based on the ability to read and apply information from a nutrition label.	0.77  -	The mean NVS score was 3.78 (SD =1.96), indicating possible limited HL in this population.	There was a moderate, positive correlation between AHL and race and income

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Zhang et al (39)	Cross-sectional study  Junior and high school students in China	Chinese Adolescent Interactive HL Questionnaire (CAIHLQ) score that ranges from 31 to 155	To examine associations between psychosomatic symptoms	22,628 from grade 7-12  Multistage stratified cluster	31 items 6 domains: Physical activities, interpersonal relationships, stress management, self-actualization, health awareness, and dietary behavior	0.91 November 2015 to January 2016	The overall CAIHLQ mean score for all participants was 104.06 ± 18.68,	The six HL subscales were closely associated with each component, and IR had the highest -value, followed by SM, DB, SA, and PA.
Yang et al (40)	Cross-sectional  Junior and senior high schools in six cities in China	CAIHLQ) by Zhang et al	To examine the association between HL and subgroups of health risk behaviors	22,628  multistage sampling	31 items with 6 domains: Physical activities, interpersonal relationship, stress management, self-actualization, health awareness, and dietary behavior	0.91  November 2015 to January 2016.	HL was associated with each subgroup of health risk behaviors	-
Tsubakita et al (45)	A cross-sectional at a nearby private high school located in the urban city of the central part of Japan	FunHLS-A unidimensional and HL Scale for Japanese Adults (HLS-14). {multi-dimension}s- A 5-point Likert-type scale	To test a model describing the hierarchical relations between functional, communicative, critical, and knowledge-based HL.	773 junior and senior high school students aged 12-18 years by convenience sampling	Fun-A 4 choices knowledge-based items communicable disease, nutrition, the body, and other knowledge (medical consultation) HLS-14- 14 items with 3 subscales: FHL, communicative HL, and critical HL.	-	Critical HL was found to be influenced by functional, communicative and knowledge-based HL, while functional and knowledge-based HL were correlated.	Critical HL had a strong positive correlation with communicative HL, but weaker positive correlations with the other 2 subscales of the HLS-14 and knowledge-based HL.
Jabeen et al (37)	Cross-sectional  Model schools of Pakistan	NVS FHL 0-1 (very limited), 2-3 (limited), and 4-6 (adequate).	To assess the FHL among adolescents	350, 15-19 years adolescents using the WHO sample size calculator Multi-stage systematic sampling	Six items each item having a score of 1 ability to read and understand written and oral information related to health.	from Jan to Dec 2016.	limited HL level (very limited = 20.9% limited = 53.4% adequate = 25.7)	People of 15 years of age had the highest percentage of FHL. Socioeconomic status did not seem to have an impact on HL. More adequate HL was observed in the lower-middle class.
Ghanbari et al (28)	Dross-sectional Qual (1st phase) and Quan (2 <sup>nd</sup> stage)  Four schools in Tehran, Iran	HL Measure for Adolescents- (HELMA)	To develop and evaluate the psychometric properties of an instrument for the measurement of HL among adolescents	Multi-stage sampling method. For Qual data, 67 in-depth interviews were conducted with students aged 15-18. Quan data = 582 adolescents	44 items with 8 domains: Access (5 items), reading (5 items), understanding (10 items), appraisal (5 items), use (4 items), communication (8 items), self-efficacy (4 items), and numeracy (3 items)	α = 0.93 2012 to February 2013.	Totally, 44 items were split into sections: Gain access to, read, understand, appraise, use, communication, self-efficacy, and numeracy.	HELMA is a valid and reliable tool for the access of the HL of adolescents aged 15-18 to evaluate different levels of functional, interactive, and critical HL in adolescents.

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Motamedi et al (38)	A cross-sectional study in high schools in Iran	NVS	To examine the relationship of body mass index with HL and regular physical activity self-efficacy	439 adolescent girls aged 15-18 years using cluster sampling	Six items each having a score of 1 ability to read and understand written and oral information related to health.	0.8 2016-2017 academic year	99.3% of the students under the study had inadequate and borderline HL.	The mean score of HL was obtained at 0.78±0.93.

*Note.* HLSAC: Health literacy in school-aged children; QOL: Quality of life; FHL: Functional health literacy; WHO: World health organization; RCT: Randomized control trial; NVS: Newest vital sign.