Screening everyday health information literacy among four populations

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Abstract

Background: People face varying obstacles when interacting with health information in their everyday lives.
Objectives: This study aims to examine the applicability of a multidimensional Everyday Health Information Literacy (EHIL) screening tool in detecting people with challenges in accessing, understanding, evaluating and using health information in everyday situations.
Methods: Previously collected EHIL screening tool data from Finnish upper secondary school students ($n = 217$), Finnish young men ($n = 1450$), Finnish adults with an increased risk for metabolic syndrome ($n = 559$) and Namibian university students ($n = 271$) were reanalysed to examine the factorial structure of the tool and to compare the groups. Statistical analyses included exploratory factor analyses, calculation of mean factor scores and one-way analysis of variance.
Results: A three factor structure ('awareness', 'access', 'assessment') for the screening tool was supported based on the Finnish samples. However, the Namibian data did not follow a similar structure. Significant differences in groupwise factor scores were discovered.
Discussion: The findings suggest that the multidimensional EHIL screening tool can be used in pointing out areas where individuals or groups may need support.
Conclusion: The tool may be useful to health information and library services workers when counselling or educating the public.

Keywords: adolescents; adults; Africa, South; education, graduate; education, nursing; health literacy; information literacy

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Key Messages

- Health information and library services workers can apply the Everyday Health Information Literacy screening tool when counselling and educating the public.
- They can use the multidimensional tool to pinpoint those aspects of health information literacy where individuals or groups need to be supported.
- Future research should explore the tool's applicability in culturally diverse information environments.
- Health information literacy should be developed as a distinct concept from health literacy.

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Introduction and background

In contemporary information environments, people are faced with a variety of challenges in reaching and expressing informed views and in making health decisions (CILIP, 2018). Mastery of the information environment, through information literacy, can be viewed as a critical strategy to reduce uncertainty (Lloyd, 2015), the basis for lifelong learning and key to empowerment (Mackey & Jacobson, 2014). The Medical Library Association embedded the concept of information literacy to a health context by defining health information literacy as 'the set of abilities needed to: recognise a health information need; identify likely information sources and use them to retrieve relevant information; assess the quality of the information and its applicability to a specific situation; and analyse, understand and use the information to make good health decisions' (Shipman, Kurtz-Rossi, & Funk, 2009). The concept highlights information literacy competencies viewed as relevant in health settings and is directed specifically to studying populations with at least basic functional literacy skills (Niemelä, Ek, Eriksson-Backa, & Huotari, 2012). In this study, previously collected data on four different populations were reanalysed to examine the applicability of a multidimensional Everyday Health Information Literacy (EHIL) screening tool, meant to detect individuals or groups facing challenges with accessing, understanding, evaluating or using health information in everyday situations (Niemelä et al., 2012). Health information and library services workers may find the screening tool useful when counselling or educating the public in interacting with health information.

Health information literacy and health literacy

As a concept, health information literacy originates from the field of library and information science and stresses individuals' role as active subjects in information acquisition rather than as objects of activities. A closely related concept is that of health literacy, which has emphasised communication between health professionals and patients, whereas health information literacy has focused on information discovery (Lawless, Toronto, &

Grammatica, 2016). More recently, however, broader conceptualisations of health literacy have emerged and the concept is seen to entail 'people's knowledge, motivation and competences to access, understand, appraise and apply health information in order to make judgements and the decisions in everyday life concerning health care, disease prevention and health promotion to maintain or improve quality of life during the life course' (Sørensen et al., 2012). Thus, the definitions of health information literacy and health literacy have begun to resemble each other. However, health information literacy can still be considered valuable as a separate concept and understood as a sub-concept of both health literacy and information literacy. Health information literacy builds upon a field of study dedicated to information related practices and capabilities, whereas health literacy research has a strong health promotional basis. Moreover, although at the level of definition, health information literacy and health literacy seem overlapping, there are differences in the ways *information* and *access*, for example, are understood in theoretical and empirical research on these literacy concepts (Huhta, Hirvonen, & Huotari, 2018a).

Measuring health information literacy

Previous empirical studies on health information literacy have focused on health professionals or medical students (McClurg, Powelson, Lang, Aghajafari, & Edworthy, 2015), the roles of libraries in promoting health information literacy (Shipman et al., 2009) and evaluation of health information literacy programmes (Ayre et al., 2014; Keselman, Chase, Rewolinski, Dutton, & Kelly, 2019). Overall, information literacy has been studied mainly in educational contexts, and there is a gap in research on information literacy in people's everyday lives (Lloyd & Williamson, 2008; Martzoukou & Sayyad, 2017).

Empirical studies on health literacy have concentrated on functional literacy and the basic numeracy skills that people need when communicating with health professionals and in health care settings (Jordan, Osborne, & Buchbinder, 2011). The commonly used measures to assess health literacy have been critiqued for

not reflecting those challenges that people with basic functional literacy skills face in their everyday lives when dealing with health information (Niemelä et al., 2012). Measures, such as the Rapid Estimate of Adult Literacy in Medicine, the Test of Functional Health Literacy in Adults or the Newest Vital Sign, may be useful in detecting people lacking basic functional literacy and numeracy skills, but fail to identify those who, despite having these basic skills, face problems in, for example, finding relevant health information or assessing its reliability. eHealth literacy measures focus on communication in online environments and, therefore, are restricted to certain contexts only (Karnoe & Kayser, 2015).

More recently, the focus of health literacy research has shifted to acknowledging the different ways people access, understand, appraise and apply health information in various situations (Sørensen et al., 2012) and this way has brought also the operationalisation of the concept closer to that of health information literacy (Huhta, Hirvonen, & Huotari, 2018b). These complex literacy competencies are extremely difficult to evaluate with so called objective measures, and increasingly, self-evaluation measures have been applied (Huhta et al., 2018b). Albeit the many challenges in using subjective measures (Gerich & Moosbrugger, 2018), they are valuable in reflecting perceived competencies that connect to the demands faced in different social environments and cultural contexts, rather than assessing decontextualised skills. An example of a self-evaluation based health literacy measure with a focus on information seeking, evaluation and use is the European Health Literacy Survey Questionnaire (HLS-EU-Q) (Sørensen et al., 2015). With a notable resemblance to the definition of health information literacy, it attempts to evaluate competencies to access, understand, appraise and apply health information in three domains: health care, disease prevention and health promotion (Sørensen et al., 2015). The original HLS-EU-Q is extensive and includes 47 statements but also shorted 16, and 6-item scales have been introduced (Pelikan & Ganahl, 2017).

Niemelä et al. (2012), to our knowledge, were the first to design a tool for health information

literacy screening. Their short 10-item EHIL[1] screening tool aimed to 'detect individuals with problems related to their interest and motivation, finding, understanding, evaluating and using of health information but being literate at the average level' (Niemelä et al., 2012 p. 130). The design of the tool was based on the Medical Library Association's definition of the concept (Shipman et al., 2009). On the basis of a pilot study among Finnish general upper secondary school students and an exploratory factor analysis, Niemelä et al. (2012) identified three independent factors, namely, 'motivation', 'confidence' and 'evaluation', as the 'most fundamental aspects of everyday health information literacy among the literate population' (Niemelä et al., 2012, p. 132). Moreover, the perceived ability to understand health related terminology was considered an essential element of health information literacy in everyday life. A question about a diagnosis of dyslexia was also included into the screening tool (Niemelä et al., 2012).

Despite the similarities of the current health literacy measures and the EHIL screening tool, it has a unique contribution with its emphasis on health information access and everyday settings. The tool has been further applied in several settings. Hirvonen (2015) and colleagues Hirvonen et al., (2016) used it to study young men's health information literacy and found a positive association between high overall scores in the screening tool and health promoting behaviour as well as objectively measured health indicators. Moreover, it was found that among young men, low scores in the screening tool were associated with information avoidance (Hirvonen, Pyky, Korpelainen, & Huotari, 2015). In a study by Enwald et al., (2018), the screening tool was used to compare the EHIL scores of young Finnish men and adults with a high risk for metabolic syndrome. These findings showed that adults with increased risk for metabolic syndrome had higher overall EHIL scores when compared to the young men. Item based analysis indicated, however, that these adults, when compared to the young men, were less likely to have confidence in their abilities to determine whom to trust in health issues and in understanding health terminology Enwald et al., (2016). Huotari et al., (2016) used the screening

tool to compare the health information literacy of Finnish and Namibian students and found that there were no significant differences in the overall EHIL scores between the groups. However, again, an item based analysis showed clear group differences. For example, the scores indicated that Namibian students were more motivated to seek health information while the Finnish students were more confident in their abilities to find, understand and evaluate health information (Huotari et al, 2016). Recently, the tool was translated to German and applied among university students to examine its factorial structure and validity (Mayer, 2018). The study found a two factor structure: 'motivation', with similar items to Niemelä et al.'s (2012) original study, and 'confidence' with items from Niemelä et al.'s 'confidence' and 'evaluation' factors (Mayer, 2018).

Focus and objectives

The EHIL screening tool designed by Niemelä et al. (2012) has been used in several previous studies, but examined either by using the sum scores of the tool (Hirvonen, 2015; Hirvonen et al., 2016), with item based analyses (Enwald et al., 2016; Huotari et al., 2016), or in a single population to determine its factorial structure (Mayer, 2018; Niemelä et al., 2012). This previous research indicates that different aspects of health information literacy stand out for different population subgroups, and if the sum scores of the tool are used to compare groups, the results can be misleading (Enwald et al., 2016). Thus, it may be useful to study the different aspects separately or in parallel to each other with a multidimensional tool. However, the findings of the factorial structure of the tool are conflicting.

This study aims to examine the applicability of a multidimensional EHIL screening tool by analysing its factorial structure in populations with varying ages, cultural backgrounds and health conditions, namely, among Finnish upper secondary school students and Finnish young men, Namibian university students and Finnish adults with an increased risk for metabolic syndrome. The study utilises previously collected data and contributes to further development of the screening tool.

The research questions are as follows:

Q1: Is the factorial structure of the EHIL screening tool similar across populations with different ages, cultural backgrounds, and health conditions?

Q2: How do the populations differ from each other based on factor scores?

Methods

Previously collected questionnaire data including responses to the EHIL screening tool (Niemelä et al., 2012) were used in this study. The data came from three Finnish population samples: upper secondary school students ($n = 217$), young men ($n = 1450$) and people with high risk for metabolic syndrome ($n = 559$). Moreover, data collected from Namibian university students ($n = 271$) with an English adaptation of the tool were included in the analysis. The screening tool, originally in Finnish, includes ten statements to which respondents are asked to respond on a rating scale from 1 (strongly disagree) to 5 (strongly agree). The statements, translated to English, are as follows:

EHIL1. It is important to be informed about health issues.

EHIL2. I know where to seek health information.

EHIL3. I like to get health information from a variety of sources.

EHIL4. It is difficult to find health information from printed sources (magazines and books).

EHIL5. It is difficult to find health information from the Internet.

EHIL6. It is easy to assess the reliability of health information in printed sources (magazines and books).

EHIL7. It is easy to assess the reliability of health information on the Internet.

EHIL8. Health related terminology and statements are often difficult to understand.

EHIL9. I apply health related information to my own life and/or that of people close to me.

EHIL10. It is difficult to know who to believe in health issues.

According to the pilot study by Niemelä et al. (2012), the following factorial structure for the scale was suggested: 'motivation' (EHIL1–3, EHIL9),

'evaluation' (EHIL6, EHIL7) and 'confidence' (EHIL10, EHIL5, EHIL4). Niemelä et al. (2012) did not include EHIL8 (the ability to understand health terminology) into the factor analysis but analysed it separately since, according to them, it is a particularly important element of health information literacy. In this study, EHIL8 was decided to be included in the analysis, and therefore, the data included in the study by Niemelä et al. (2012) was also reanalysed. This data on Finnish students were collected in an Upper Secondary School in Oulu, in northern Finland in April 2011. In total, 217 students returned a completed questionnaire including the ten EHIL statements. The mean age of respondents was 17.7 and they represented both genders (see Table 1 and Niemelä et al., 2012 for further details).

The data on young Finnish men were collected with the screening tool at the Finnish Defence Forces' call-ups in the city of Oulu, Finland, in September–December 2012 and 2013. In Finland, military or civil service is mandatory for all male citizens and annually all 18 year old men are called for service through call-ups. Thus a large, population wide, representative sample of young men was reached. The study was part of a larger MOPO study and was approved by the local ethical committee (see also Ahola et al., 2013; Enwald et al., 2018; Hirvonen, 2015; Hirvonen et al., 2016; Huotari et al., 2016). All 2507 men present at the call-ups in 2012 and 2013 were invited to participate in the study, and 1870 (74.6%) did so. Of the participants, 1450 (77.5%; 57.8% of the total population) responded to each screening tool item. The mean age of the men was 17.9 years. Most of them studied in either the general or vocational track of upper secondary school at the time, and lived with one or both parents (see Table 1 and Hirvonen, 2015 for further details).

The data on individuals with high risk for metabolic syndrome were collected within the multidisciplinary intervention study. Improved Methods of Lifestyle Modification for Patients at High Risk for Metabolic Syndrome (PrevMetSyn) (see Alahäivälä, Oinas-Kukkonen, & Jokelainen 2013; Karppinen et al., 2014; Salonurmi et al., 2018). Applying random sampling by using the address and information system of the Finnish Population Register Centre, a population based sample of 1065 volunteers were screened for the intervention study. The inclusion criteria for the intervention were age 20–60 years, high body mass index (27–35 kg/m^2), and the possibility and ability to use a computer and the Internet. The EHIL screening tool was included in an online questionnaire administered at the beginning of the intervention study in February 2013 to February 2014. Of the participants, 559 responded to each screening tool item. The mean age of the respondents was 45.8 years, and they represented both genders (see Table 1 and Enwald et al., 2016 for further details).

Table 1 Basic information on the included data sets

	Finnish students (*n* = 217)	Finnish young men (*n* = 1450)	Finnish adults (*n* = 559)	Namibian university students (*n* = 271)
Age, range (mean, SD)	17–20 (17.7; 0.7)	17–23 (17.9; 0.7)	20–61 (45.8; 10.0)	17–19 (19.6; 1.1)
Gender (male/female %)	47/53	100/0	50.7/49.3	61.3/38.7
Data collection time	April 2011	September–December 2012 and 2013	February 2013–February 2014	2013–2014
Data collection	In Oulu, Finland, at an upper secondary school	In Oulu, Finland, at Finnish Defence Forces call-ups	In Oulu, Finland, in connection to participation to an intervention study	At the University of Namibia, main campus in Windhoek, Namibia
Sampling	Convenience	Population based	Intervention participants	Stratified/convenience
Questionnaire	On paper, in Finnish	On paper, in Finnish	Online, in Finnish	On paper, in English

The data on Namibian university students were collected in 2013 and 2014 among full time students at University of Namibia's main campus in Windhoek, Namibia. The English version of the screening tool was used. The sampling techniques were a combination of stratified and convenience sampling. The population was stratified by the Faculties, and within the Faculties convenience sampling was applied. Altogether, 271 students responded to each screening tool item. The mean age of the respondents was 19.6 years, and the majority (93%) of them were in their first year of study (see Table 1 and Huotari et al., 2016).

The internal consistency of the 10-item EHIL screening tool was analysed using unstandardised Cronbach's alpha. Principal component analysis was chosen as the extraction method in the exploratory factor analyses because the aim was to describe the factorial structure of the screening tool. According to the Kaiser–Guttman criterion, all factors with an eigenvalue > 1 were extracted. To improve the interpretability of the extracted factors, an orthogonal rotation (Varimax criterion) technique was applied, yielding statistically independent factors. Factor scores were calculated with the regression method, and one-way analysis of variance (ANOVA) and post hoc comparisons using the Tukey HSD test were used to examine differences between populations. Statistical analyses were performed using the IBM Statistical Package for the Social Sciences (SPSS) version 22.0.

Results

Cronbach's alphas for the 10-item screening tool were 0.558 (Finnish students), 0.627 (young Finnish men), 0.569 (Finnish people with a high risk for metabolic syndrome) and 0.583 (Namibian university students). These relatively low values indicated multidimensionality of the tool, which was further explored by means of exploratory factor analyses. As a prerequisite for these analyses, the Kaiser–Meyer–Olkin measure of sampling adequacy values and Bartlett's test of sphericity were inspected. Kaiser–Meyer–Olkin values of 0.629, 0.759, 0.650 and 0.609, respectively, exceed the critical value of 0.500 and indicate that conducting exploratory factor analyses is adequate in these samples, because there is a sufficient proportion of covariance between variables, which might be caused by underlying factors. In addition, Bartlett's test of sphericity was significant ($P < 0.001$) in all samples, also indicating that factor analyses are useful with the data because there are sufficiently close statistical associations between variables.

The exploratory factor analyses indicated a three factor structure for the screening tool in each Finnish sample. In the Namibian sample, a four factor structure was found (see Table 2).

Since the Namibian sample did not follow a similar factorial structure as the other samples, the Namibian data were excluded from further analyses. When analysing the Finnish data as a whole, a three factor structure was found (see Table 2). The three factors were labelled 'awareness', 'access' and 'assessment'. 'Awareness' included four statements that focused on the perceived importance of health information (EHIL1), awareness of its sources (EHIL2), willingness to use various sources (EHIL3) and applying health information (EHIL9). 'Access' included four statements concerning the ability to understand health terminology (EHIL8), recognise authoritative sources (EHIL10), and find information from print sources (EHIL4) and online (EHIL5). Finally, 'assessment' included two statements that related to evaluation of health information originating from print (EHIL6) and online (EHIL7) sources (see Table 3).

One-way analysis of variance (ANOVA) showed significant differences between the three populations in standardised mean factor scores. In Table 4, the scores are shown in homogeneous subsets signifying statistically significant differences between the groups. As shown in Table 4, each group significantly differed from each other in terms of the 'awareness' and 'access' mean factor scores. In the 'awareness' factor, young men scored lowest, adults with a high risk for metabolic syndrome the highest, and students' in between the two other groups. In the 'access' factor, adults scored the lowest, young men the highest, and, again, students between the two groups. In the 'assessment' factor, a significant difference was found only between students and adults, adults scoring lower than students.

Table 2 Results of exploratory factor analyses (rotated component matrix) of data collected from the four samples. For the purpose of clarity, only factor loadings >0.35 are printed in the table

Sample item	Factor loadings											
	Finnish students (n = 217)			Finnish young men (n = 1450)			Finnish adults (n = 559)			Namibian university students (n = 271)		
EHIL10	0.64			0.78			0.59			0.77		
EHIL8	0.39			0.74			0.65			0.75		
EHIL5	0.81			0.76			0.73				0.79	
EHIL4	0.68			0.73			0.76				0.75	
EHIL1		0.76			0.86			0.76				0.77
EHIL3		0.80			0.77			0.78				0.72
EHIL2		0.54			0.75			0.62				0.46
EHIL9		0.52			0.58			0.59				0.59
EHIL7			0.73			0.84			0.85			0.75
EHIL6			0.72			0.82			0.85			0.88
Variance*	49.9%			63.4%			55.8%			59.5%		

*Total variance explained (cumulative).

Table 3 Results of exploratory factor analyses (rotated component matrix) of the Finnish data pooled into one (n = 2238). For the purpose of clarity, only factor loadings >0.50 are printed in the table

Factor	Item	Factor loadings		
Awareness	EHIL1		0.84	
	EHIL2		0.70	
	EHIL3		0.80	
	EHIL9		0.67	
Access	EHIL4	0.71		
	EHIL5	0.75		
	EHIL8	0.71		
	EHIL10	0.71		
Assessment	EHIL6			0.81
	EHIL7			0.83
	Variance*	61.6%		

*Total variance explained (cumulative).

In other words, young men had below average scores in 'awareness', above average scores in 'access' and average scores in 'assessment'. Students' scores were above average in both 'awareness' and 'assessment' but slightly below average in 'access'. Among adults with a high risk for metabolic syndrome, above average scores were found in 'awareness', and below average scores in 'assessment' and 'access'.

Table 4 Standardised mean factor scores (estimated by regression method) and results of post hoc comparisons between groups (Tukey's HSD; using Harmonic Mean Sample Size = 362.55)

Factor	Standardised mean factor score*			F- and P- values for ANOVA (df 2, 2223)
	Young men	Students	Adults	
Awareness	−0.300$_a$	0.317$_b$	0.654$_c$	237.90, <0.001
Access	0.194$_a$	−0.049$_b$	−0.483$_c$	101.60, <0.001
Assessment	0.003	0.160$_a$	−0.069$_b$	4.10, 0.016

*Within each row, groups means with different subscripts (a, b, c) differ significantly at $P < 0.01$ (awareness, access) or $P < 0.05$ (assessment) (Tukey's HSD).

Discussion

This study aimed at examining the applicability of a multidimensional EHIL screening tool by analysing its factorial structure in groups with varying ages, cultural backgrounds and health conditions. The results indicate that the EHIL screening tool can be valuable in indicating the varying challenges different populations face with respect to health information. Based on the analysis, the factorial structure of the screening tool was found to be robust in the Finnish samples, but not in the Namibian

sample. Therefore, more research is needed to study the tool's applicability to culturally diverse information environments.

As expected, the Cronbach's alphas for the 10-item EHIL scale were found to be rather low in all samples indicating that the assumption of unidimensionality could not be upheld for the screening tool. Moreover, even moderate to high internal consistency (>0.70) does not guarantee the unidimensionality of a measure (Schmitt, 1996). Exploratory factor analysis was found to be useful in examining the underlying dimensionality of the tool and the analyses corroborate that its structure is multifactorial. Supporting the findings of Niemelä et al. (2012), three independent factors were identified in all Finnish samples. They were relabelled as 'awareness', 'access' and 'assessment' (see Figure 1).

The 'awareness' and 'assessment' factors were found across all samples, both Finnish and Namibian; these factors were identified in each population with similar items. Also in a study with a German version of the screening tool (Mayer, 2018), an 'awareness' factor (labelled as 'motivation') with similar items (EHIL1, EHIL2, EHIL3, EHIL9) has been identified.

EHIL8 ('Health related terminology and statements are often difficult to understand'), an item that Niemelä et al. (2012) analysed separately, was included in the 'access' factor in the Finnish samples. In the Namibian sample; however, four independent factors were discovered and 'access' was divided into two with items on understanding health information and recognising relevant authorities (EHIL8 and EHIL10) and finding information (EHIL4 and EHIL5) loading into separate factors. The differences may be partly explained by the evidently dissimilar health information environments in Namibia and Finland, including differences in the cultures of oral storytelling and reading texts, as well as the information infrastructure (Huotari et al., 2016). However, the Namibian sample was relatively small, a translated version of the EHIL tool was used, and most participants did not respond in their own language. In a study with the German version of the screening tool (Mayer, 2018), items EHIL4, EHIL7, EHIL8 and EHIL10 loaded into one factor labelled as 'confidence'. Thus, further data should be collected to determine whether this factorial structure would hold in larger and more diverse samples before interpreting the results, for example in terms of cultural differences.

The comparison of the groupwise standardised mean factor scores revealed interesting differences between the groups. Young men, who are
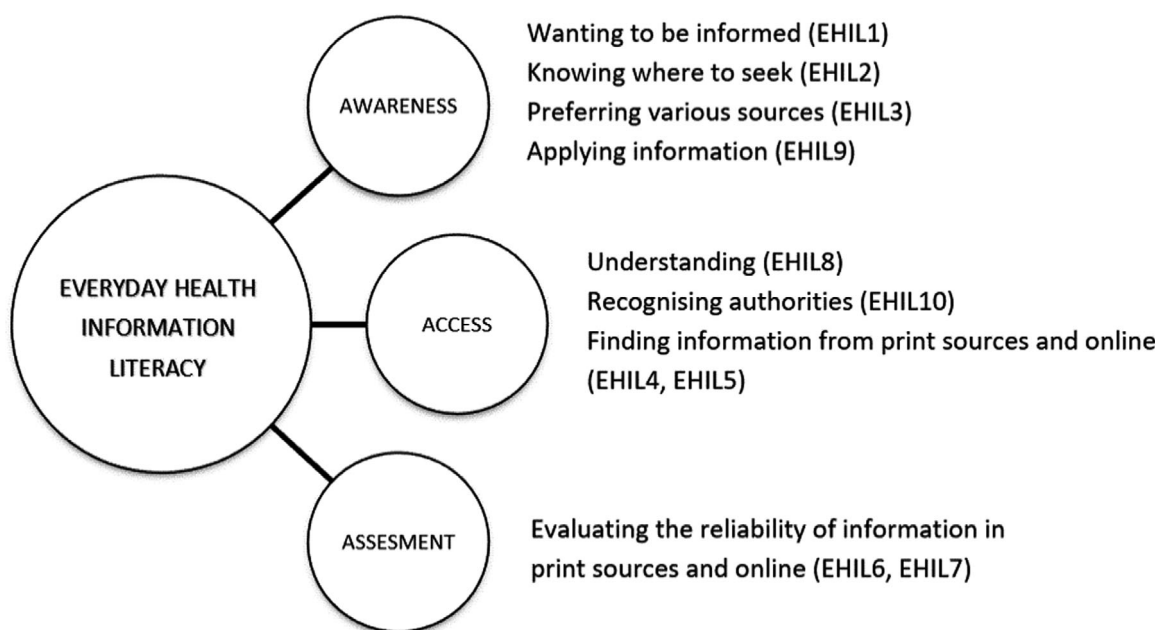

Figure 1 Three factors of the Everyday Health Information Literacy screening tool: awareness, access and assessment

typically suggested to be unconcerned about health in general (Manierre, 2015) and to have beliefs of invulnerability to harm (Millstein & Halpern-Felsher, 2001), were found to have below average scores in 'awareness'. The adults who were aware of having a high risk for metabolic syndrome, on the other hand, showed above average scores in 'awareness', possibly indicating acknowledging the need to be well informed about health topics to prevent illness. They are likely to already have gained experience in seeking complex health information, which can be reflected in lowered confidence in their own abilities to find, understand, and evaluate the credibility of health information (below average scores in 'access'). Students gained above average scores in 'assessment', hinting towards more confidence than adults in their abilities to evaluate the reliability of health information. However, with regard to this factor, the differences between all the groups were small. This indicates that there did not appear to be clear contrasts between the groups regarding perceived competence in information assessment.

These findings demonstrate the usefulness of assessing the three EHIL screening tool's aspects – 'access', 'awareness' and 'assessment' – separately. Using merely the total score of the tool would have masked the differences between samples, which are here revealed by considering the factor scores. As Niemelä et al. (2012) acknowledge, there are no rapid methods to screen overall EHIL. However, even with a simple screening tool, individuals or groups with difficulties in different areas of EHIL may be identified. With its focus on abilities to obtain and use health information in various everyday situations, the EHIL screening tool differs from commonly used health literacy measures that concentrate on reading and numeracy skills needed in health care settings (Jordan et al., 2011) as well as from the eHealth literacy measures that concentrate on skills needed in online environments (Karnoe & Kayser, 2015). It does resemble more recent health literacy measures such as the HLS-EU-Q (Sørensen et al., 2015). However, the EHIL screening tool, when used as a multidimensional measure, may have value in pointing out the areas where individuals or groups may need support in rather than as a tool for categorising people based on their literacy level. Based on these findings, different aspects of EHIL, such as awareness, access and assessment, should be investigated separately but in parallel to each other.

Health information and library services workers, consumer health librarians in particular, can consider using the multidimensional EHIL screening tool to guide health information literacy counselling or education directed to different groups. User education, including information literacy instruction, is one of the emerging duties of librarians working in a health information professional contexts (Butler, 2019; Cooper & Crum, 2013; Ma, Stahl, & Knotts, 2018; Teal, Wax, Eldredge, & Hendrix, 2004). Also in public libraries, librarians can assist users in finding relevant and credible health information (Noh, 2015). By first mapping which aspects of health information literacy individuals or groups face challenges with, education can be targeted to better meet people's needs (see Huotari et al., 2015). This kind of mapping could also be beneficial for providing tailored health information in eHealth services (Enwald, Hirvonen, Korpelainen, & Huotari, 2015).

Limitations

Considering the age of the participants and the data collection years of the pilot study and the MOPO study, it is possible that some participants may have taken both surveys. Overall, the data used in this study do not represent the Finnish population as a whole as young men are over-represented. More research is needed to study the tool's applicability to culturally diverse information environments. As the tool indicates self-evaluated competencies, it should not be used as a measure of literacy level.

Conclusions

This study is among the first systematic examinations of the structural validity of a health information literacy measure with multiple populations. As such it makes a unique contribution to a field of research characterised by a lack of validated measures and little reproducibility. Further research focusing on developing health information literacy as a concept and on the tools that can be

used to evaluate and promote it is recommended. The concepts of health literacy and health information literacy are often used synonymously and at the level of definition may seem overlapping (Huhta et al., 2018a). However, health information literacy research, building upon a field of study dedicated to information related practices and competencies, can bring value to both health related literacy research and to health information and library practice.

Funding

Conflict of interest

The authors declare no conflict of interest. The funding sponsors had no role in the design of the study; in the collection, analyses or interpretation of data; in the writing of the manuscript; and in the decision to publish the results.

Note

[1]In Finnish the screening tool is called *Arkielämän terveystiedon lukutaidon seulontaväline.*

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