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Validation of three Arabic health literacy assessment tools in Lebanon

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Summary

Health literacy is an important predictor of health status, health behaviours, and other health outcomes. However, research on health literacy in the Arab world is scarce and no health literacy tool has been validated to test the health literacy level of the Lebanese population so far. The aim of this study was to validate Arabic translations of three commonly used health literacy assessment tools, the S-TOFHLA, the REALM-R, and the Brief Health Literacy Screening items. The tools were linguistically and culturally adapted to the Lebanese context, and 250 face-to-face interviews were conducted in an outpatient clinic in Beirut, Lebanon, between April and June 2015. The General Self-Efficacy Scale and socio-demographic questions such as gender, age, origin, education and chronic condition were included to assess predictive validity. Reliability of the instruments was found to be low to high (Cronbach's $\alpha = 0.94$ for the S-TOFHLA, Cronbach's $\alpha = 0.46$ for the REALM-R). Younger and highly educated participants scored higher on the S-TOFHLA. The Brief Health Literacy Screening items were significantly correlated with age, education, self-efficacy and the S-TOFHLA, reinforcing the convergent and predictive validity of the two tools. Results indicate that the S-TOFHLA and the three screening questions are a valuable tool to measure health literacy in Lebanon and, allowing for minimal adaptations according to each country's healthcare system, in the entire Arabic-speaking area.

Key words: health literacy, Arabic, S-TOFHLA, REALM-R, brief health literacy screening items

INTRODUCTION

Health literacy, defined as 'the personal, cognitive and social skills which determine the ability of individuals to gain access to, understand, and use information to promote and maintain good health' (Nutbeam, 2000), has continued to receive increasing attention as a research field for the past 20 years (Ishikawa and Yano, 2008; Peerson and Saunders, 2009; Pleasant, 2012; Sörensen *et al.*, 2012). Several studies found health literacy to be an important predictor of people's health status and other health outcomes (Dewalt *et al.*, 2004), adherence to official health-related recommendations (Zhang *et al.*, 2014), and medical expenditures (Howard *et al.*, 2005). As health literacy started to become recognized as a priority by health authorities and governments worldwide (Carmona, 2006), studies in health literacy, both empirical and conceptual, have also been increasingly appearing outside the US,

where the field originated (Paasche-Orlow, 2009; Pleasant, 2012). Research on health literacy has been conducted, among others, in China (Mantwill and Schulz, 2015), Japan (Ishikawa *et al.*, 2008), Korea (Lee *et al.*, 2009), Israel (Baron-Epel *et al.*, 2007), Turkey (Eyüboğlu and Schulz, 2015), Switzerland (Wang and Schmid, 2007; Connor *et al.*, 2013), Russia (Blizniuk *et al.*, 2014), the UK (Ibrahim *et al.*, 2008), the Netherlands (Twickler *et al.*, 2009), Australia (Barber *et al.*, 2009), Brazil (Carthery-Goulart *et al.*, 2009), Singapore (Ko *et al.*, 2011), and Serbia (Jović-Vraneš *et al.*, 2014).

Health literacy in the Arab world

Despite facing numerous public health challenges and displaying some of the highest levels of illiteracy (World Bank; Jabbour, 2003, 2013; Jabbour *et al.*, 2012), the Arab world has produced very little research on health literacy. Furthermore, the two studies available are restricted to only two Arab countries that display unique socio-political characteristics. These include the validation of the Arabic Rapid Estimate of Adult Literacy in Dentistry (AREALD-30) in Saudi Arabia (Tadakamadla *et al.*, 2014) and the validation of the SILS, Newest Vital Sign (NVS) and the short version of the Functional Health Literacy Test for Adults (S-TOFHLA) in Iraq (Al-Jumaili *et al.*, 2015). The Rapid Estimate of Adult Literacy in Medicine (REALM) has been validated in Arabic outside the Arab world among a sample of Moroccan Berber women in the Netherlands (Bekker and Lhajoui, 2004).

Objective of the study

The present study aimed at systematically adapting and validating Arabic versions of three widely used health literacy assessment tools to be used in the Lebanese healthcare context: the Rapid Estimate of Adult Literacy in Medicine revised (REALM-R), the Short Test of Functional Health Literacy for Adults (S-TOFHLA), and the three Brief Health Literacy Screening items. Although a mismatch exists between the elements of the definition provided in the introduction and the content of the screening tools that are the object of this study (Pleasant, 2013), adapting tools that measure functional literacy has been regarded as an optimal starting point for conducting research on health literacy in a country where this is lacking. Considering that Lebanon has not produced any research on health literacy so far, this study provides new insights that might trigger further studies and interventions aimed at increasing the ability to navigate the local healthcare system among patients at risk of low health literacy.

Study instruments

The Rapid Estimate of Adult Literacy in Medicine revised (REALM-R) is a brief screening instrument used to assess the ability to pronounce common medical words in adults. The aim of the tool is to help medical professionals identify potential low-literate patients in a shorter time compared to the REALM, taking only 2 minutes to administer and score. Patients are asked to pronounce words that they are likely to encounter in medical settings and that they are expected to understand while interacting with their physician (Bass *et al.*, 2003).

While the REALM-R is a word recognition test, the S-TOFHLA is a reading comprehension and numeracy instrument. It is self-administered and is made of a reading comprehension part including 36 cloze items and a numeracy section including four questions. It requires approximately 12 minutes to administer, and only answers in the reading part given within 7 minutes are counted for scoring (Baker *et al.*, 1999).

The Brief Health Literacy Screening items assesses participants' perceived ability to read and understand health-related information (Chew *et al.*, 2008). Taken separately, the questions are good predictors of limited health literacy. The questions ask about how frequently the participant seeks help to read hospital materials, how frequently the participant has problems in understanding written information, and how confident the participant is with medical forms. Participants are asked to choose between all of the time, most of the time, some of the time, a little of the time, or none of the time.

We also included the General Self-Efficacy Scale (Schwarzer and Jerusalem, 1995) for predictive validity. The Arabic GSE is a 10-item psychometric scale designed to assess the perceived ability to cope with a variety of demanding situations. The scale explicitly refers to personal agency, i.e. the belief that one's actions are responsible for successful outcomes.

METHODS

Adaptation of the tools

The S-TOFHLA, the REALM-R and the three Brief Health Literacy Screening items were adapted to the Lebanese linguistic and cultural context following the standard methodologies for questionnaire translation (Sperber *et al.*, 1994; Sidani *et al.*, 2010). All tools were translated from English into Arabic by an independent Arabic native speaker, and later back-translated by a second translator to establish semantic equivalence. Formal comparison between the two English versions (the original and the result of the back-translation) followed. To

establish experiential equivalence, part A and part B of the S-TOFHLA were adapted following guidelines from key personnel at the American University of Beirut Medical Center, who provided information on how patients are given instructions before an examination and on the different health insurance schemes in the Lebanese health care system. This allowed to incorporate a number of changes to reflect the experience patients are likely to have had in the target context. Revision followed the adaptation of the tools, which were finally evaluated by a professional Arabic instructor for clarity and comprehensiveness.

We conducted a pre-test with 20 patients attending the AUB Medical Center between January and March 2015 to establish face and cultural validity. Data were analysed and the items that did not show acceptable reliability were subject to minor changes.

Sample

Data were collected between April and June 2015 in Beirut, Lebanon. Face-to-face interviews were conducted by a trained interviewer at the AUB Medical Center with patients who had a clinical appointment in the Division of Gastroenterology. In total, 564 individuals were invited to participate in the study. Of these, 314 people refused to be interviewed and 250 accepted (response rate = 44%). The most common reasons reported for non-participation were lack of time ($n = 229$), tiredness and pain ($n = 30$), lack of interest in taking part ($n = 47$), and inability to read Arabic ($n = 8$). Of the 250 interviews conducted, 230 were considered suitable and were retained for the analysis, while 20 were discarded due to inconsistencies in the drafts of the questionnaires.

At the beginning of each interview, the interviewer introduced himself and asked the participant to sign an informed consent, explaining that all data would be treated confidentially and that withdrawal from the study would be possible at any time. The first part of the interview was self-administered and consisted of the 36 embedded answers questions of the S-TOFHLA (part A and B, stopped after 7 minutes), the Brief Health Literacy Screening items, the General Self-Efficacy Scale and a number of demographic questions (gender, year of birth, origin, education and chronic condition). The interviewer conducted the second part, which consisted of the REALM-R and the four numeracy items of the S-TOFHLA.

Ethical approval

The Institutional Review Board of the American University of Beirut approved the study on 7 January 2015.

Analyses

Regarding the S-TOFHLA (Baker *et al.*, 1999), each correct answer was scored with 1 point, while every incorrect answer with 0 points, for a total possible score of 40. Concerning the REALM-R, we adopted the scoring system suggested by the authors (Bass *et al.*, 2003). The first three words (fat, flu, pill) were not counted toward the final scoring and 1 point was given for each correct answer, with a final score of 8. As for the Brief Health Literacy Screening items (Chew *et al.*, 2008), we assigned the values 0, 1, 2, 3, and 4 to the five possible responses to each of the questions, with higher scores reflecting low health literacy. We analysed each screening question independently. Reliability analyses were calculated for the REALM-R and the S-TOFHLA by Cronbach's α. Pearson's correlation coefficients were computed to assess the association between the three validated tools and other known predictors of health literacy, such as age and education. A linear regression model allowed the estimation of the relationship between the S-TOFHLA and socio-demographic variables such as age, gender, education, origin and presence of a chronic condition. The statistical significance level was set at $p < 0.05$. Data were analysed using SPSS (version 21).

RESULTS

Characteristics of the sample and health literacy scores

The final sample included 230 participants (see Table 1 for an overview on the characteristics of the sample). The number of men and women was almost equal (53% female). The mean age of our sample (37.5 years) appears to be higher than the one reported nationally (29.3 years; Indexmundi, 2015). This does not surprise as we looked into a population using health services for adults, therefore implying a shift towards an older population. Most participants had completed university (53%) while only a small minority merely had intermediate education (4%). Comparing with the latest population-based data available for Lebanon, our sample appears to be more educated than the average population, which can be expected from patients attending private clinics in Lebanon (Ministry of Social Affairs, 2007). In terms of origin, the majority of our respondents were Lebanese nationals, while about 35% came from either Syria, Palestine or Iraq, who are expected to be among the users of services at AUB-MC. Only a minority (11%) reported having a chronic condition. Regarding the S-TOFHLA, most participants (81%) had an adequate health literacy level, while the rest had either a marginal

or inadequate level, with similar proportions (10%). We found little variance in the REALM-R scores, with only four participants scoring less than 8 points.

Reliability
The S-TOFHLA showed good internal consistency ($\alpha = 0.94$). The correlation between the numeracy score and the reading comprehension was found to be $r = 0.44$. The REALM-R showed lower internal consistency ($\alpha = .46$) and was therefore excluded from the following analyses.

Predictive validity
To check the association of functional health literacy with socio-demographic variables, correlations were computed between two of the health literacy tools (the S-TOFHLA and the Brief Health Literacy Screening items) and age, education, and self-efficacy. The S-TOFHLA was significantly correlated with age ($r = -0.25$), education ($r = 0.39$) and self-efficacy ($r = 0.39$). The first two statements of the three Brief Health Literacy Screening items were significantly correlated with age ($r = -0.33$ and $r = -0.29$), education ($r = 0.33$ and $r = -0.30$) and self-efficacy ($r = 0.53$ and $r = -0.50$), while the third statement was associated with education ($r = 0.34$) and self-efficacy ($r = 0.46$) only.

We conducted a number of independent *t*-tests to check possible differences in the health literacy scores between men and women, Lebanese and foreigners, and chronic patients vs. non-chronic patients. No significant differences were found in terms of gender, or chronic condition for any of the tests used, while origin made a difference in one of the Brief Health Literacy Screening items, with foreigners significantly reporting to need more frequent help in reading hospital material, with $t(178) = 2.374$, and $p < .05$.

Convergent validity
To assess convergent validity, the Brief Health Literacy Screening items were employed. They were all significantly correlated with the S-TOFHLA reading comprehension part, with Pearson's *r* ranging among 0.29, -0.32 and 0.48 across the three items. Furthermore, they were significantly correlated with the General Self-Efficacy Scale with Pearson's *r* ranging between 0.46, -0.50 and -0.53.

Regression model
We estimate a regression model of socio-demographic characteristics and the S-TOFHLA (see Table 2 for the results of the regression analysis). The REALM-R was excluded from the regression due to low reliability and poor distribution, while the Brief Health Literacy Screening items were excluded as they mainly served to assess convergent validity. Gender, age, education, origin and chronic condition were included in a regression model that explained 22% of the variance in the S-TOFHLA reading comprehension section. Age and education remained significantly correlated with health literacy.

DISCUSSION
This is the first study testing health literacy in Lebanon. The S-TOFHLA showed to be a reliable measure as indicated by an overall high Cronbach's α ($\alpha = 0.94$). In view of our sample's characteristics, the lower reliability score showed by the REALM-R ($\alpha = 0.46$) might indicate that the tool is too simple for its administration there. Our results partly confirm what other studies have found. The distribution of the health literacy scores obtained in the S-TOFHLA by our sample reflects previous works where the majority of the sample had adequate health literacy (Al-Jumaili *et al.*, 2015; Mantwill and Schulz, 2015). Moreover, both the S-TOFHLA and the Brief Health Literacy Screening items were significantly associated with age and education, two established predictors of health literacy (Paasche-Orlow *et al.*, 2005). In particular, older and less educated participants scored lower on the S-TOFHLA and on the first two statements of the Brief Health Literacy Screening items, which is in line with previous studies (Levinthal *et al.*, 2008), thus reinforcing the predictive validity of the two validated tools. Choosing among large amounts of information to make decisions about one's health can in fact be challenging to older and poorly educated patients (U\.S\. Department of Health and Human Services, 2007).

The lack of variance on the REALM-R scores is most likely due to the words to be read in the test being too easy for the sample under investigation. Considering the high education level of our participants, they were probably very familiar with the pronunciation of the 8 words of the test. Using the long version of the test (REALM; Davis *et al.*, 1993) or targeting another area might have yielded different results.

Comparable to previous studies, gender was not an important predictor of health literacy for any of the tests used (Connor *et al.*, 2013), nor was chronic condition. This could be the case because the tools that we employed do not reflect the totality of the health literacy

Table 1: Characteristics of the sample

Variable	$n = 230$ (100%)
Mean age (years)	37.5 (SD = 12.5)
Gender	
Female	53% ($n = 122$)
Education	
University degree	53% ($n = 121$)
Professional school	21% ($n = 48$)
Secondary education (grade 10 to 12)	22% ($n = 51$)
Intermediate education (grade 7 to 9)	4% ($n = 9$)
Origin	
Lebanese	66% ($n = 151$)
Syrian	14% ($n = 33$)
Palestinian	11% ($n = 26$)
Iraqi	7% ($n = 15$)
Chronic condition	
Yes	11% ($n = 26$)
No	62% ($n = 143$)
No response	27% ($n = 61$)
Health literacy level (S-TOFHLA)	
Inadequate health literacy	
(0-16 correct answers)	10% ($n = 22$)
Marginal health literacy	
(17-22 correct answers)	10% ($n = 22$)
Adequate health literacy	
(23-36 correct answers)	81% ($n = 186$)

Table 2: Association between the S-TOFHLA reading comprehension part and education, gender, age, chronic condition and origin in a linear regression model

	S-TOFHLA		
Variable	Standardized beta	t	p
Education	0.439	6.096	< .001
Gender	0.072	1.04	0.3
Age	−0.218	−2.787	< .01
Chronic condition	0.031	0.438	0.662
Origin	0.029	0.361	0.719
R^2	0.222		

construct. Moreover, a partial explanation could also be that our sample was very educated, therefore even participants with a chronic condition status are likely to score high in our tests. Contrary to our expectations and to what previous studies have found (Kreps and Sparks, 2008), the country of origin was not associated with health literacy either. This is probably due to two main factors. First, we recruited in a University Medical Center, which is more expensive than public hospitals and requires patients to be able to afford the high cost of

services. Second, it might be that, considering the recent restrictions imposed by Lebanon on entering the country, only wealthy migrants can afford obtaining a visa. This issue applies to Iraqis more than the other two groups.

Limitations

The present study is subject to a number of limitations. First of all, we recruited a convenience sample, therefore, the results cannot be generalized to the whole Lebanese population. Also, since the nature of participation was voluntary, it might be the case that low-literate participants refused to join the study to avoid shame (Parikh *et al.*, 1996). Second, as a stark gap exists between urban and rural spaces in Lebanon, recruiting in different areas might have yielded different results in terms of socio-demographic characteristics and health literacy scores. Finally, considering that our sample was highly educated, the lack of variance in the numeracy section of the S-TOFHLA and in the REALM-R might mean that more difficult word recognition tests should be designed.

CONCLUSIONS

While further research is needed to assess the health literacy level and its social determinants among a broader and more diverse Lebanese population, the validated S-TOFHLA and the Brief Health Literacy Screening items have showed to be reliable and valid measures to be used in clinical settings in Lebanon. Further research is needed in the rest of the Arab world to assess whether these two tools, if appropriately adjusted to each country's healthcare system (e.g.: Part B of the S-TOFHLA could be modified according to the national health insurance scheme), could be used to measure health literacy locally.

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AUTHORS' CONTRIBUTIONS

All authors contributed to the conceptualization of the study, the analysis of the data and the drafting of the manuscript. All authors approved the final manuscript.

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