Feasibility of Implementing Alcohol Health Literacy Tests in Colombia

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ABSTRACT

This study aimed to identify patients' sub-groups through measures of socio-demographic variables, alcohol consumption and alcohol health literacy. Instruments were administered to a sample of 118 patients in Colombia. Multiple Correspondence Analysis (MCA) was used to identify subgroups of individuals with common characteristics. Two groups were identified: one of women with good knowledge about alcohol consequences, low acceptability of regular alcohol intake, lower levels of alcohol drinking, and less openness to discussing alcohol with health practitioners; and one of men with lower levels of knowledge, higher levels of cultural acceptability of drinking, higher levels of consumption, and more openness to discussing alcohol. Results indicate that the higher the risk of alcohol, the more openness to discussing alcohol with health practitioners.

Keywords*: alcohol drinking, health literacy, primary health care*

INTRODUCTION

Alcohol consumption is a leading contributor to the global non-communicable disease burden (Lim et al., 2012; Whiteford et al., 2015), associated with adverse social and economic consequences that extend beyond the individual drinker to their families, communities and society as a whole (World Health Organization, 2011). Alcohol consumption is a major contributor to global health inequalities, with alcohol-related harm aggravated by lower socio-economic status (Probst et al., 2014). Latin America has the highest alcohol-attributable disease burden after Eastern Europe and Sub-Saharan Africa, with particularly high risks in alcohol-attributable traffic injury and violence (Shield et al., 2020). Over one in five drinkers in Latin America engage in heavy episodic drinking at least monthly, with men drinking more often and in higher quantities than women in most countries (Blanco et al., 2016).

The World Health Organization (WHO) has set a global target to reduce the harmful use of alcohol by 10% between 2010 and 2025 (WHO 2013). WHO launched its SAFER initiative that calls on governments at all levels to: (1) Strengthen restrictions on alcohol availability; (2) Advance and enforce drunk driving counter measures; (3) Facilitate access to screening, brief interventions and treatment; (4) Enforce bans or comprehensive restrictions on alcohol advertising, sponsorship, and promotion; and (5) Raise prices on alcohol through excise taxes and pricing policies (WHO 2020).

Questionnaire-based measurement and brief advice programs delivered in Primary Health Care (PHC) are effective and cost-effective (Levin et al. 2015; O'Donnell et al. 2016; Anderson et al. 2017; Angus et al. 2017) in reducing heavy drinking. However, despite the evidence base, to date, measurement and brief advice and treatment programs have failed to achieve widespread take-up (OECD 2015). One reason for poor uptake is likely due to a focus on providers alone, whereas successful implementation of health interventions within a complex health system demands addressing a range of underlying structural and support systems (Barker et al. 2016). Phase IV of the WHO Safer initiative on the identification and management of alcohol-related problems in primary care outlined a range of conclusions for enhancing the widespread uptake of measurement and brief advice programs to reduce the

harmful use of alcohol, including the need to improve alcohol health literacy and to reframe views about alcohol amongst the public (Heather 2006). Alcohol health literacy is likely to affect the decisions and actions that people make around alcohol, and in turn their capacity to prevent and manage alcohol-related harm (DeWalt et al., 2004; Von Wagner et al., 2007).

Health literacy (HL) has been defined as the "degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Ratzan & Parker 2000). This, and similar definitions (Sørensen et al., 2012), remain salient today (Parker & Ratzan 2019). HL is a complex concept, with multiple components, including sufficient skills in reading and writing to be able to function effectively in everyday (health) situations (functional health literacy); more advanced cognitive and literacy skills which, together with social skills, can be used to actively participate in everyday activities, to extract information and derive meaning from different forms of communication, and to apply new information to changing circumstances (interactive health literacy); and, more advanced cognitive skills which, together with social skills, can be applied to critically analyze information, and to use this information to exert greater control over life events and situations (critical health literacy) (Nutbeam, 2000). All of these competencies are required to make, and act upon, informed decisions about drinking alcohol (Okan et al., 2020).

There is no agreed definition of alcohol literacy, rather Okan et al., (2020) propose applying a broader definition that incorporates societal and public health perspectives, reflecting the need for alcohol-related skills to be developed across public and civic society.

Poor general health literacy is known to be associated with worse overall health outcomes (DeWalt et al., 2004; Sørensen et al., 2015), increased risk of mortality in older people (Bostock & Steptoe, 2012), lower self-rated health (Sørensen et al., 2015), and more adverse behavioral risk factor choices, including the use of alcohol (Sørensen et al., 2015). Understanding and measuring patients' health literacy in relation to behavioral risk factors such as alcohol consumption is an important goal in the prevention and detection of chronic disease (Taggart et al., 2012), and is required by policymakers, researchers and health promotion practitioners

in order to develop and deliver effective services (WHO Europe, 2013; World Health Organization, 2015).

The present paper derives from the SCALA (Scale-up of Prevention and Management of Alcohol Use Disorders and Comorbid Depression in Latin America) project, whose overall aim is to test multi-level strategies to promote the implementation of primary health care-based measurement, advice and treatment for heavy drinking and comorbid depression at the municipal level in three Latin American countries, Colombia, Mexico and Peru (see SCALA study protocol for further details, Jané-Llopis et al., 2020). Within the SCALA project, clinical approaches and municipal support measures external to the primary health care centers are embedded within health literacy approaches (Sørensen et al., 2012). Elsewhere, we have demonstrated that providing training to the practitioners in the SCALA project increases the proportion of patients whose alcohol consumption is measured and the proportion of heavy-drinking patients advised to reduce their consumption (Anderson et al., 2020).

The aims of the present study are to:

1. Produce, and have patients complete, an alcohol-adapted version of the Single Item Literacy Screener (Morris et al., 2006) UK-based Newest Vital Sign (Rowlands et al., 2013) and an adapted version of the European Union-based Health Literacy Survey-EU Questionnaire (HLS-EU Q) (Sorensen et al., 2013) to measure patient skills and competences to reduce heavy drinking, tailored to local circumstances; and

2. Identify sub-groups of patients across the measures of alcohol health literacy, alcohol consumption and socio-demographic variables.

Due to the Covid-19 pandemic, patient completion of the alcohol health literacy measures across two of the three countries (Mexico and Peru) was halted early. In this paper, we report results from Colombia.

METHODS

Assessment instruments and data collection procedures

Data were collected from 118 primary health care patients in Soacha y Madrid (Colombia) between December 2019 and March 2020 using two different instruments.

The first instrument (see footnote, Table 1) comprised a paper record sheet that was completed by PHC providers during consultations with eligible patients (aged 18+ years) on two consecutive days during month three of the study's implementation period (Jané Llopis et al., 2020). These sheets recorded the age, sex and educational level of the patient; measured the patients' alcohol consumption using AUDIT-C (SAMHSA, undated) and captured information from the patient on alcohol knowledge (Rosenberg et al., 2018), social norms (Chung & Rimal 2016) and health literacy applied to alcohol.

The second instrument (see footnote, Table 1) was administered to a sample of patients once the consultation with the provider had ended. Eligible patients (those able to read and write), having given written informed consent, were invited to self- complete a series of questions in the waiting room before leaving the PHCU. Additional data collected in these self-completed questionnaires included the patients': 1) experiences of the consultation; 2) views on being asked about alcohol consumption; 3) exposure to communication and media campaigns on alcohol; and 4) health literacy as it applies to alcohol.

To assess patient alcohol health literacy, we developed three separate measures in consultation with local stakeholders in Colombia: a measure of literacy and numeracy as related to alcohol (The Literacy and Numeracy (Alcohol) Test (LINAT)), based on the UK-based Newest Vital Sign (Rowlands et al., 2013); a measure of self assessed functional, interactive and critical alcohol health literacy, the Alcohol Health Literacy Measure (AHLM), adapted from the European Union-based Health Literacy Survey-EU Questionnaire (HLS-EU Q) (Sorensen et al., 2013); and a single item screening question to provide to a rapid assessment of patient alcohol health literacy, the Single Item Alcohol Literacy Screening Question (SIALS) developed from the Single Item Literacy Screener (Morris et al., 2006). All items

were translated into Spanish (Jané-Llopis et al., 2020). User feedback, gathered through two rounds of cognitive testing, indicated that the measure of literacy and numeracy as related to alcohol, that based on the Newest Vital Sign, was too complex, given the low levels of general literacy and numeracy in the population. This measure was thus simplified. The measures developed are shown in appendices (tables)1, 2 and 3. Since the SCALA project had to be terminated early due to the COVID-19 pandemic (Anderson et al., 2021), formal validation of the Alcohol Health Literacy measures could not be undertaken.

Alcohol health literacy was also explored through patient-reported ease of understanding of information they may have seen about the harms caused by alcohol. The sample comprised 118 patients, all of whom were invited to participate.

Variables

A concept map for alcohol health literacy was designed, based on Paasche-Orlow and Wolf (2007). This guided the list of measured variables to be included in the analysis (Table 1).

All the variables in the concept map for which data had been collected were included in the first step of the analysis, but only those that contributed to the constitution of the main axes in the multiple correspondence analysis (MCA) were included in the final stage.

Statistical analysis

We undertook univariate and bivariate analyses for the preliminary description of the variables. We then undertook MCA to identify profiles from the subset of variables with better conformation of the factor axes, using FactoMineR (Lê et al., 2008), within the statistical package, R.

MCA identifies a set of factors with which it is possible to construct a factor plane in which the individuals and study variables can be projected; in this way, subgroups of individuals with common characteristics can be identified. This technique allows the relationships between numbers of variables to be explored simultaneously, although it does not have the scope of the parametric methods themselves. It enables identification of the mini-

TABLE 1

Measured variables included in the analysis

Area of concept map	Concept	Variables	Data source[a]
Precursors and mediators	Demographic characteristics	Age	Provider-asked question (DC)
		Education	Provider-asked question (DC)
		Gender	Provider-asked question (DC)
	Culture related to alcohol	Is it acceptable for friends to drink more than two drinks a day?	Provider-asked question (DC)
		Is it acceptable for friends to drink more than six drinks at one time?	Provider-asked question (DC)
	Single Item Alcohol Literacy Screening Question (SIALS)	Question on how easy it is to understand information about the harms caused by alcohol	Provider-asked question (DC)
Alcohol Health Literacy	The Literacy and Numeracy (Alcohol) Test (Shortened)	Question on drunk driving	Self-completed patient questionnaire (AC)
		Question on standard drinks in alcohol container	Self-completed patient questionnaire (AC)
	Alcohol Health Literacy Measure (AHLM)	6-item exploration of people's views on how easy or difficult they find it to get hold of, understand, and use information about alcohol	Self-completed patient questionnaire (AC)

Moderators	Interactions with health care professionals	Six-variable questionnaire aimed at talking to the doctor or other health professional about the amount of alcohol the patient drinks	Self-completed patient questionnaire (AC)
	Self-care	Tried to reduce alcohol consumption in previous 12 months	Self-completed patient questionnaire (AC)
	Alcohol knowledge	Three-variable questionnaire addressed to the knowledge about the effects of alcohol consumption on health	Provider-asked questions (DC)
Outcomes	Alcohol behavior	Three questions on alcohol consumption (AUDIT-C), related to the first three questions of the AUDIT-10. AUDIT-C scores were dichotomized in 0 and >1	Self-completed patient questionnaire (AC)

[a]DC: during consultation:
Instrument: https://www.scalaproject.eu/images/x_Ins6_Arm1234_Provider_Extended_Tally_Sheet_IMP_PER_EN.pdf.
AC: after consultation:
Instrument: https://www.scalaproject.eu/images/x_Ins22_Arm1234_Patient_questionnaire_3M_and_13M_EN.pdf.

mum number of factors that allow the variability of the data to be ordered. When a quantity of variability contained in two factors is achieved, an adequate representation of individuals and variables in a plane is possible.

MCA involves the identification of the minimum number of dimensions (axes) in which an adequate representation of people and variables can be achieved. For this purpose, inertia is calculated. Inertia (the chi square statistic divided by the sample size), corresponds to the dispersion of the model categories and is measured in terms of distance. To establish if the MCA is appropriate, the percentage of inertia explained must be at least that obtained by the 0.95-quantile of the distribution of the percentages obtained by simulating data tables of equivalent size on the basis of a normal distribution (in this case, 673 data tables), calculation provided by FactoMineR. We also employed R^2 to establish how variables contribute to each dimension. This value indicates which variables are linked to which dimensions, by correlation ratio between each variable and the correspondent dimension. This is the indicator used in one-way analysis of variance, and it is interpreted as the percentage of the quantitative variable (the dimension), explained by the qualitative variable (each variable in the analysis)   (Husson et al., 2017). It is recognized that the MCA is an analytical method free of assumptions, like other methods that demand normality or linearity (Costa et al., 2013; Rodriguez-Sabate et al., 2017).

Ethical approval

The Ethics Committee of the Technical University of Dresden gave final ethical approval for the SCALA project on 12 April 2019, EK90032018. All participating PHC units, participating PHC providers and patients signed an informed consent form for participation.

RESULTS

At the point where data collection was curtailed due to the COVID-19 pandemic, 118 patients had been recruited in Colombia, all of whom provided completed data. The characteristics of the participants recruited and a descriptive analysis of the measured variables and whether or not they were included in the final stage of the MCA are presented in Table 2.

TABLE 2

Descriptive analysis of the measured variables and whether or not included in the final stage of the MCA.

Variables	Men	Women	All	Included in final stage of MCA
Demographics				
Gender N (%)	25 (21.2)	93 (78.8)	118 (100)	Yes
Age years (mean (SD))	54.3(17.5)	48.2(18.9)	49.5 (18.7)	No
Education level (%)				
Primary school	15 (60.0)	46 (49.5)	61 (51.7)	No
Secondary school	8 (32.0)	33 (35.5)	41 (34.7)	
Higher education	2 (8.0)	14 (15)	16 (13.6)	
Alcohol Health Literacy				
Ease of understanding information about the harms caused by alcohol (mean (SD) of 4-point Likert scale from 1 'very easy' to 4 'always difficult'. N=109 (9 respondents stated 'had never seen any information about harm caused by alcohol')	1.60 (0.58)	1.68 (0.68)	1.66 (0.66)	No
Is it safe to be in a car driven by someone who has been drinking alcohol in the last few hours? (% who answer 'yes') (Literacy and Numeracy Alcohol test (Shortened): literacy question)	0.0%	1.1%	0.8%	No

What drink contains two standard drinks? (% Correct answer) (Literacy and Numeracy Alcohol test (Shortened): numeracy question)	76%	71%	72%	No
Alcohol Health Literacy Measure (AHLM) Six questions measuring easiness of finding, understanding, assessing and using information about alcohol (Mean (SD)) of 4-point Likert scale from 1 'always difficult' to 4 'always easy' averaged across six questions)	3.02 (0.75)	3.01 (0.64)	3.01 (0.66)	Yes
Alcohol information environment				
Six questions measuring positive views about talking about alcohol with health care provider or others (Mean (SD)) of 5-point Likert scale from 5 'strongly agree' to 1 'strongly disagree' averaged across twelve questions)	4.03 (0.45)	4.09 (0.41)	4.07 (0.42)_	Yes
Tried to reduce alcohol consumption in previous 12 months				
Less strong alcohol choice (% who answer 'yes')	40.0	11.1	20.3	No
Use of smaller glasses (% who answer 'yes')	40.0	15.8	17.8	No

Knowledge on health-related problems				
High blood pressure (% who answer alcohol can cause)	68.0	72.0	71.2	Yes
Liver problems (% who answer alcohol can cause)	80.0	87.1	85.6	Yes
Cancer (% who answer alcohol can cause)	52.0	67.7	64.4	Yes
Social acceptance				
Acceptable for friends to drink more than two drinks a day (% who answer 'yes')	32.0	6.5	11.9	Yes
Acceptable for friends to drink more than six drinks at one time (% who answer 'yes')	44.0	21.5	26.3	Yes
AUDIT C (% with score 1+)	64.0	50.5	53.4	Yes

The participant sample of 118 patients was mostly female (79%), with a mean age of about 50 years. Most participants had a primary-level education (52%). In this multiple correspondence analysis, the first two dimensions of analysis comprise 48.2% of the total dataset inertia; that means that 48.2% of the total variability is explained by the plane.
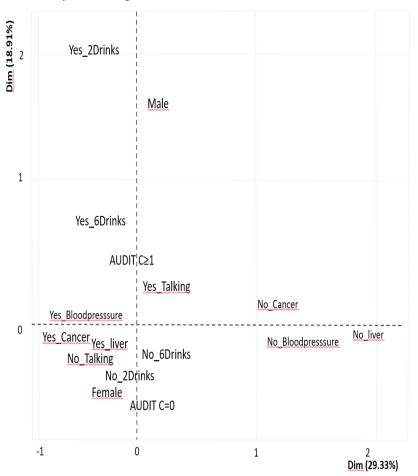
Figure 1 displays the variables factor map. The horizontal axis of the plane is mainly defined by knowledge of the health consequences due to alcohol consumption so that the more to the right, the less the knowledge. The vertical axis is mainly defined by the sex of the participant and by considering it acceptable for a friend to drink more than two drinks a day and having an AUDIT-C score of one or more.

The MCA mainly indicated two groups in the sample with distinct characteristics:

1. Group one comprised women with good knowledge about the health damage that can be done by alcohol and lower levels of alcohol drinking as indicated by the AUDIT-C scores. The responses to the cultural acceptability questions indicated a low acceptability of regular alcohol intake. This group did not find talking with health professionals about alcohol acceptable.

2. Group two comprised men with lower levels of knowledge about the potential health damage done by alcohol, and higher levels of drinking alcohol as indicated by AUDIT-C scores. The responses to the cultural acceptability questions indicated higher acceptability of regular alcohol intake. This group found it more acceptable to talk with health professionals about alcohol.

3. Once the factors were obtained, the analysis by Ward's grouping method showed that when the participants were divided into two groups, the first of them would have 67.8% of the total.

FIGURE 1

Variables factor map.

Yes_2Drinks: It is acceptable that friends have more than two drinks a day; No_2Drinks: It is unacceptable that friends have more than two drinks a day; Yes_6Drinks: It is acceptable that friends have more than six drinks on an occasion; No_6Drinks: It is unacceptable that friends have more than six drinks on an occasion; Yes_Talking: easy to talk to my doctor about alcohol; No_Talking: not easy to talk to their doctor about alcohol; AuditC≥1: AUDITC greater than or equal to 1; AUDITC = 0: AUDITC equal to zero; Yes_Bloodpressure: alcohol can cause high blood pressure; No_Bloodpressure: alcohol cannot cause high blood pressure; Yes_Cancer: alcohol can cause cancer; No_Cancer: alcohol cannot cause cancer; Yes_Liver: alcohol can cause liver problems; No_Liver alcohol cannot cause liver problems.

DISCUSSION

Principal findings

This study successfully developed three measures of alcohol health literacy exploring different aspects of the concept. A concept map of alcohol health literacy was developed, and determined the variables to be analyzed, including alcohol health literacy precursors, moderators and outcomes. Recruitment was curtailed in all three countries due to the COVID-19 pandemic; at the time when recruitment was stopped, 118 patients had been recruited in Colombia. Most of the patients recruited were women, aged approximately 50 years and had received a primary-level education. The proportion of participants with higher (i.e., tertiary) level education was 13.6%. This compares with the national percentage of 23% (OECD).

Of the variables included in the analysis, gender, the 6-item Alcohol Health Literacy Measure, the Alcohol Information Environment, knowledge of the adverse health effects of alcohol, and social acceptability of alcohol drinking, were included in the final stage of the MCA. Of note is the high proportion of the sample who knew about the health problems that alcohol can cause. In relation to cancer, 64.4% knew that alcohol can cause cancer, in contrast to a study from Canada, where only 24.5% of liquor store customers knew this (Vallance et al., 2020). Similarly, knowledge about the relationship between alcohol drinking and hypertension appeared to be higher (71.2%) than in other studies, for example, a survey of Irish adults (50.7%) (O'Dwyer 2019). The high level of knowledge about the link between alcohol drinking and liver problems (85.6%) is similar to that found in other studies (O'Dwyer 2019).

The results show that the two main factorial axes collect a significant percentage of the variance, thus achieving a good reduction of the set of variables in two axes (48.2%) and they carry enough information from the data set. The first dimension (horizontal) is defined by knowledge about the effects of alcohol on health and the willingness to talk to the doctor about drinking. The second dimension is defined by the patient's gender, her friends' acquiescence to drinking, and whether or not she has an AUDIT-C that indicates a problem drinking. The R^2 ratio indicates that the first dimension refers to health knowledge, so that

the total number of participants can be segmented into those who know more and those who know less about health. The second dimension corresponds to the separation between men and women, complacency with frequent drinking by friends, and the AUDIT-C score. Thus, MCA indicated the presence of two main groups of patients, with different levels of knowledge about the potential harms of alcohol, levels of alcohol intake, and cultural acceptability of regular alcohol drinking. Interestingly, and reassuringly, it is the group at higher risk from alcohol (largely men, who tended to have lower knowledge of alcohol-related harms, more cultural acceptability of regular drinking, and higher levels of drinking) who indicated openness to discussing alcohol with health practitioners.

It is interesting that none of the three alcohol health literacy measures contributed to the profiles identified through MCA. This is a surprising finding, given that the conceptual map developed for this project hypothesised that alcohol knowledge and behavior would be outcomes of alcohol health literacy. A possible explanation for this finding is that the three questions did not discriminate sufficiently between the study participants from Colombia; an alternative explanation is that the full sample size across the three countries, curtailed due to COVID-19, was too small to show such an effect. Further investigations with larger sample sizes would be required to investigate this further.

Strengths and limitations

The SCALA study is the first multi-country primary health care-based implementation study on alcohol measurement and advice for heavy drinking undertaken in middle-income countries with alcohol health literacy a core component. The alcohol health literacy tests were developed from well-recognized and validated general health literacy measures and refined using feedback from study partners and community members.

Due to the early cessation of patient recruitment subsequent to COVID-19 mitigation measures, a pragmatic decision was made to undertake MCA to see whether this might illuminate information of interest for alcohol health literacy. MCA is a useful procedure to find relationships between a significant number of variables and identify groups of participants that are not evident. However, a larger number of participants is desirable to achieve

better profiling of the groups of people characterized in the analysis. Although MCA can help to find associations between a large number of variables and participants, the relationship between the variables is not causal. This should be addressed in subsequent analyses in development of the SCALA project.

On the other hand, using the MCA for multivariate analysis implies advantages and disadvantages: one of the advantages is that there are no important assumptions about the distribution of the variables, nor about the independence of the variables (Costa et al., 2013; Rodriguez-Sabate et al., 2017). Other methods, such as latent class analysis (LCA), rely on strong assumptions such as local independence (Collins & Lanza, 2010). In this sense, the MCA is highly recommended to reduce dimensional space and explore relationships between a plural number of variables without the constraints of strong assumptions. However, compared to the LCA, the MCA has several disadvantages: with the LCA the clusters are formed from a probabilistic formulation, while the MCA is based on the analysis of the distances between scores. Thus, the LCA is based on the construction of models that can be comparable through goodness-of-fit indicators (Collins & Lanza, 2010). Furthermore, the calculation of the class size is obtained as a direct consequence of the LCA, whereas in the MCA it is necessary to use additional analysis to establish the approximate size of the clusters. On this occasion, considering the size of the sample and the nature of the variables, the MCA was used; however, in other conditions, a combination of the two methods is recommended to obtain benefit from the characteristic graphic representation of the MCA and the probabilistic description achieved through the LCA.

MCA has been used before in Colombia to analyze a wide set of variables on alcohol consumption in adolescents, achieving the characterization of groups of consumers that are associated with the severity of consumption and risks related to it (Pérez et al., 2015; Pérez & Scoppetta, 2008).

Meaning of the study: possible explanations and implications for clinicians and policymakers

This study would indicate that, in our sample in Colombia, there were two quite distinct groups of patients, principally differentiated by gender. One of the groups (men with high alcohol

intake and higher cultural acceptability of regular alcohol drinking, with low knowledge of the health risks of alcohol) appeared to be more open to discussions with their health practitioners about alcohol. It is reasonable to hypothesise that alcohol health literacy plays a part in the drinking patterns, cultural acceptability, and knowledge about the health impacts of alcohol drinking in this group, and that they may be more open to intervention(s) to develop their alcohol health literacy as a tool to develop alcohol-related knowledge, confidence and skills. In contrast, women with low alcohol intake, lower cultural acceptability of alcohol drinking, and good knowledge of the potential adverse effects of alcohol drinking, would not only seem to be in less need of alcohol health literacy interventions, but also less receptive to them.

Further studies are required to explore these hypotheses further. It would be particularly interesting to see if the strong gender differences seen in alcohol behavior, culture, and knowledge, are seen in the other Latin American countries where the SCALA project is taking place.

CONCLUSIONS

This study aimed to develop measures of alcohol health literacy, exploring different aspects of the concept, and to identify sub-groups of patients across the measures of alcohol health literacy, alcohol consumption and socio-demographic variables. MCA indicated the presence of two groups with different characteristics. Whilst these findings would indicate that the group at highest risk of alcohol-related harm (men, who tended to have low knowledge of alcohol-related harms, more cultural acceptability of regular drinking, and higher levels of drinking) might benefit from alcohol health literacy interventions, the absence of health literacy scores from the MCA profiles means that further studies are needed to investigate this.

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TRIAL REGISTRATION

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