



Association between acculturation surrogates and alcohol consumption in rural-to-urban migrants: The PERU MIGRANT study



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ABSTRACT

Introduction: There is a paucity of information about the association between acculturation and alcohol consumption in rural-to-urban migrants who move to urban environments usually characterized by a higher prevalence of alcohol consumption than their rural places of origin.

Objectives: To evaluate the cross-sectional association between surrogates of acculturation and alcohol consumption in Peruvian rural-to-urban migrants; to explore the effects of sex and age at migration on these associations; and to explore this association longitudinally.

Methods: Data from the PERU MIGRANT Study, which evaluated a cohort of Peruvian rural-to-urban migrants from 2007 to 2012, were analyzed. Four acculturation surrogates were evaluated: language preference on the radio, language spoken at home, Spanish proficiency, and length of residence in urban area. Alcohol consumption was defined as having consumed alcohol in the last year at the time of the baseline survey, while onset of alcohol consumption was defined as having consumed alcohol in the last year at the follow-up survey. Poisson regressions with robust variance were performed to estimate crude and adjusted prevalence ratios (PR) and relative risks (RR) with a 95% confidence interval (95% CI) to cross-sectional and longitudinal analyses respectively.

Results: Data from 567 rural-to-urban migrants, mean age 47.6 years (SD \pm 11.5), 52% females, was included in the study. Crude cross-sectional analyses showed an association between acculturation surrogates and alcohol consumption, but these were not observed in adjusted regressions. In the sex-stratified analyses, only women showed an association between Spanish proficiency and alcohol consumption, where those with higher language proficiency had a 22% higher prevalence of alcohol consumption (PR: 1.22, 95% CI: 1.04–1.43). Analyses stratified by age at migration showed no association between acculturation surrogates and alcohol consumption. On the longitudinal analyses, acculturation surrogates were not associated with the onset of alcohol consumption.

Conclusions: No association between acculturation surrogates and alcohol consumption in cross-sectional and longitudinal analyses were found. The only exception was observed in female migrants according to their Spanish proficiency and alcohol consumption.

Introduction

Acculturation is a phenomenon defined as “the process by which groups of individuals having different cultures come into continuous first-hand contact with subsequent changes in the original culture patterns of either or both groups” (Rogler et al., 1991), and usually seen in a context of migration. As a complex process, acculturation depends on several aspects related to culture and ethnicity, but it is also closely linked with language given that it is considered as a central part of a culture’s identity (Schwartz et al., 2010). Acculturation has been evalu-

ated using many proxies or surrogates, some of them including language characteristics among individuals who have migrated, for example host language proficiency (Jiang et al., 2009, Bernabe-Ortiz et al., 2010), language preference (Bernabe-Ortiz et al., 2010, Faber et al., 1986) and language spoken at home. Considering that acculturation is a continuous and cumulative phenomenon, the length of residence in the host area could be helpful as another proxy of acculturation (Li and Wen, 2015, Gfroerer and Tan, 2003).

Several studies have shown that acculturation is associated with the adoption and increase of alcohol consumption among people who migrate from one country to another, also referred as international mi-

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grants (Zemore, 2007, Weber, 1996, Tran et al., 2015). In these circumstances, the patterns of alcohol consumption could be understood as a temporal coping mechanism, particularly in the initial stages of migration (Gorman et al., 2018), which may further transition towards the adoption and establishment of a new behavior in the case when the host culture have higher levels of alcohol consumption compared to the places of origin of the migrant population (Lee et al., 2006). As such, it could be posed that a similar relationship between acculturation and alcohol consumption would also occur in the context of rural-to-urban migration, in which rural people would increase their consumption of alcohol as they acculturate to urban settings where there is a higher prevalence of alcohol consumption than in the rural areas (Peer et al., 2013).

The association between acculturation surrogates and alcohol consumption among rural-to-urban migrants has not been thoroughly studied, with one study reporting findings from a non-probabilistic sample of Mexican indigenous people that have intermittent residency in the United States, and therefore do not have a permanent exposure to the urban setting (Pinedo et al., 2014). Furthermore, most of the literature has shown sex to have a modifying effect on the association between acculturation and alcohol consumption (Zemore, 2007, Vaeth et al., 2012), and few studies have compared this association by age at migration subgroups (Li and Wen, 2015, Kimbro, 2009). Those who migrate at younger ages may have better changes of adopting a more favorable set of behaviors of the host culture, given their longer exposure to their new location Kimbro (2009). Finally, the literature exploring a longitudinal association between acculturation surrogates and is largely absent.

In Peru urban people have a higher prevalence of alcohol consumption than their rural counterparts INEI (2019), therefore the present study has three objectives: 1) to evaluate the cross-sectional association between surrogates of acculturation and alcohol consumption among Peruvian rural-to-urban migrants, 2) to evaluate this association in subgroups defined by sex, and age at migration, and 3) to explore the longitudinal association between acculturation surrogates and the onset of alcohol consumption in this population.

Methods

Study design and context

We performed cross-sectional and longitudinal analyses using data from the PERU MIGRANT study (Miranda and Bernabe-Ortiz, 2017, Miranda et al., 2009, Carrillo-Larco et al., 2017) that includes the evaluation of a cohort of rural-to-urban migrants who migrated in the context of terrorism in the late 1990s. Migrants were originally born in the department of Ayacucho, located in the Peruvian highlands, and migrated and settled down in Lima, the capital of Peru, in a peri-urban shantytown named “Las Pampas de San Juan de Miraflores” (Miranda et al., 2009, Carrillo-Larco et al., 2017). There is no specific data about alcohol consumption in these places but it is known that the prevalence of alcohol consumption in urban areas in Peru is higher than in rural areas INEI (2019).

Procedures

Baseline recruitment was conducted between 2007–2008 using a single stage random sampling technique, stratified by age and sex groups. In the follow-up, five years after the baseline assessment, participants were visited in the same place where they were originally evaluated. Data collection in both periods was performed by trained fieldworkers after obtaining informed consent. Fieldworkers used validated questionnaires, in which verbal questions were asked in Spanish or Quechua according to each participant’s preference.

Population

People that were more than 30 years old were considered eligible for the study. Pregnant women and those with mental disorders precluding voluntary participation were excluded. For the purpose of this study, we also excluded those who did not respond to questions regarding frequency of alcohol consumption at baseline or follow-up.

To evaluate the association between surrogates of acculturation and alcohol consumption we focused on the rural-to-urban migrant group, whereas the original PERU MIGRANT Study also included non-migrant individuals from rural and urban areas (Miranda et al., 2009, Carrillo-Larco et al., 2017). For the purpose of this study, population size was the metric used to define rural and urban areas. Using the United States Department of Agriculture’s Rural-Urban Continuum Codes (Hart et al., 2005), we considered areas with more than 2,500 inhabitants to be urban.

From 1,785 rural-to-urban migrants eligible for the study, 984 were randomly selected. From those, 160 decided not to participate, 132 were not found in their home, and 103 withdrew from the study or decided not to participate in the study for other reasons, leaving 589 migrants that completed the baseline PERU MIGRANT study. Migrants that decided not to participate did not show differences in educational attainment and length of residence in urban areas compared with those who have completed the study, as detailed elsewhere (Miranda et al., 2009). The follow-up was completed by 526 rural-to-urban migrants (89.3% of migrants evaluated at baseline), as 14 were deceased and 49 were either not able to be located or did not want to participate in the study (Burroughs Pena et al., 2015).

Study variables

Outcomes: alcohol consumption

Our two outcomes of interest were alcohol consumption for the cross-sectional analysis, and onset of alcohol consumption for the longitudinal analysis. Alcohol consumption was evaluated at the baseline assessment through the question: “How often have you consumed alcoholic beverages in the last year?” We categorized those participants who had reported to sometimes drink alcohol as consumers; those who reported not drinking alcohol were classified as non-consumers. The onset of alcohol consumption was evaluated only for those participants who were categorized as non-consumers in the baseline assessment, and we categorized those participants who had reported to consume alcohol at least sometime in the follow-up as new consumers.

Main exposures: acculturation surrogates

We include four surrogates of acculturation that were categorized in dichotomous variables (Schwartz et al., 2010, Bernabe-Ortiz et al., 2010, Li and Wen, 2015):

Language preference on radio was measured with the question “If available on the radio, what language would you prefer to listen to?” We classified participants who responded “only Spanish” as highly acculturated, and those who responded “only Quechua” or “Quechua or Spanish” as low.

Language spoken at home was measured with the questions “In which language do you speak with your partner/sons/parents/friends?” We classified participants who responded “only Spanish” as highly acculturated, and those who responded “only Quechua” or “Quechua or Spanish” as low.

Spanish proficiency was measured through the question “In your opinion, how well do you speak Spanish?”, since Spanish is the language used in the host urban setting. We classified participants who responded “pretty well” and “very well” as highly acculturated, and those who had responded “not too well” or “not at all” as low.

Length of residence in urban area was defined as the number of years lived in Lima as reported by the study participant. This surrogate was included considering the hypothesis that acculturation increases the more

time that rural-to-urban migrants are exposed to the urban settings. The median of this variable was 30 years. Therefore, we classified participants who had reported to live > 30 years in Lima as highly acculturated, and those who had reported to live ≤30 years as low.

Co-variables

We included other variables from baseline: sex; age in four categories, 30–39, 40–49, 50–59, and ≥60 years old; and education level, categorized as none/incomplete primary, complete primary, and some secondary or higher. Socioeconomic status was obtained using a multi-deprivation index and was categorized as low upon having two or more socioeconomic deprivations (education, income, overcrowding, assets), and current smoking was defined as having smoked at least one cigarette in the last 30 days and having smoked 100+ cigarettes in the lifetime (Taype-Rondan et al., 2017). Age at migration was categorized as ≥15 or <15 years, corresponding to the median value of this variable in our population, which also aligns with a critical age period in the life course of individuals.

Statistical analysis

For descriptive purposes, absolute and relative frequencies were used to summarize sociodemographic characteristics among alcohol consumers and non-consumers.

To evaluate the cross-sectional association between acculturation surrogates and alcohol consumption in rural-to-urban migrants, as well as subgroup analysis for sex and age at migration groups, we used Poisson regression models with robust standard deviation estimators and calculated crude and adjusted prevalence ratios (PR) and their 95% confidence interval (95% CI). Sex and age at migration were assessed as potential effect modifiers using multiplicative interaction analysis.

To evaluate the longitudinal association between surrogates of acculturation at baseline and the onset of alcohol consumption at follow-up we used Poisson regression models with robust standard deviation estimators and calculated crude and adjusted relative risk ratios (RR) and their 95% CI.

Adjusted models included adjustment by the following covariables: age, sex, education level, socioeconomic status by a multi-deprivation index, and current smoking as potential confounders. All statistical analyses were performed using Stata v13.0 for Windows (STATA Corporation, College Station, Texas, US).

Results

Participant's characteristics

For cross-sectional analyses, we included 567 out of 589 rural-to-urban migrants, 199 out of 201 rural residents and 192 out of 199 urban residents, after eliminating those who had no data about alcohol consumption in the baseline assessment. Those rural-to-urban migrants excluded from the analysis did not show important differences in terms of socioeconomic characteristics and surrogates of acculturation, compared with those with available alcohol consumption information.

Among the 567 rural-to-urban migrants included, mean age was 47.6 years (SD: 11.5, range: 30 to 88), 295 (52.0%) were women, 273 (48.2%) had not completed secondary education, 464 (81.8%) were of low socioeconomic status by a multi-deprivation index, 52 (9.2%) were current smokers, and 278 (49.8%) had migrated before the age of 15 years old.

With regards to the surrogates of acculturation, 157 (28.1%) preferred to hear only Spanish on the radio, 518 (92.0%) spoke only Spanish at home with any of their siblings, parents, partner, or friends, 408 (72.8%) claimed to be proficient in Spanish, and 285 (51.0%) had lived in Lima for over thirty years. In terms of alcohol consumption, 103 (18.2%) were classified as consumers of alcohol. Bivariate analy-

Table 1

Baseline characteristics of alcohol consumers and non-consumers among rural-to-urban migrants. The PERU MIGRANT Study, 2007-2013.

Variables	Alcohol consumption*		p-value (χ^2 test)
	No (N=103) n (%)	Yes (N=464) n (%)	
Sociodemographic characteristics			
Age			
30–39	22 (13.8)	137 (86.2)	<0.001
40–49	20 (12.1)	145 (87.9)	
50–59	32 (19.6)	131 (80.4)	
≥60	29 (36.3)	51 (63.8)	
Sex			
Women	67 (22.7)	228 (77.3)	0.003
Men	36 (13.2)	236 (87.8)	
Education			
None/ Some primary	49 (27.8)	127 (72.2)	<0.001
Complete Primary	16 (16.5)	81 (83.5)	
Some secondary	38 (13.0)	255 (87.0)	
Multi-deprivation index**			
No	73 (15.7)	391 (84.3)	<0.001
Yes	30 (29.1)	73 (70.9)	
Current smoking			
No	100 (19.4)	415 (80.6)	0.015
Yes	3 (5.8)	49 (94.2)	
Age at migration to Lima			
<15 years old	48 (18.8)	230 (81.3)	0.624
≥15 years old	53 (17.2)	228 (82.9)	

* Have consumed alcohol sometime during the last year.

** Present at least two socioeconomic deprivations (education, income, overcrowding, assets)

ses showed a significant association between the included sociodemographic characteristics and alcohol consumption (Table 1).

Cross-sectional analyses

In the crude cross-sectional analyses, including all rural-to-urban migrants, those highly acculturated by language preference on the radio had a 10% higher prevalence of alcohol consumption than those who were not, those acculturated by language spoken at home had a 30% higher prevalence of alcohol consumption than those who were not, and those acculturated by Spanish proficiency had a 17% higher prevalence of alcohol consumption than those who were not. Those highly acculturated by the length of residence in urban area had an 8% lower prevalence of alcohol consumption than those who were not. However, in adjusted models, none of these surrogates of acculturation were associated with alcohol consumption (Table 2).

Subgroup analysis showed a significant interaction effect of sex on the association with alcohol consumption, but only in the case of Spanish proficiency ($p = 0.019$). Among women migrants, those highly acculturated by Spanish proficiency presented a 21% higher prevalence of alcohol consumption than those with lower acculturation, and this was not observed in men. In the subgroup analysis by age at migration, there was no evidence of an association between acculturation surrogates and alcohol consumption (Table 3).

Longitudinal analyses

From the 567 rural-to-urban migrants enrolled at baseline, 103 were classified as non-consumers of alcohol, of which 88 (85.4%) reported an onset of alcohol consumption in the follow-up period, and were there-

Table 2
Cross-sectional association between baseline surrogates of acculturation and baseline alcohol consumption in overall rural-to-urban migrants. The PERU MIGRANT Study, 2007-2013.

Surrogates of acculturation	n/N (%)	Alcohol consumption	
		Crude	Adjusted*
		PR (95% CI)	PR (95% CI)
Language preference on radio			
Only Quechua/Quechua or Spanish	319/401(79.6)	Ref	Ref
Only Spanish	138/157(87.9)	1.10 (1.02 to 1.19)	1.08 (1.00 to 1.16)
Language spoken at home			
Only Quechua/Quechua or Spanish	29/45(64.4)	Ref	Ref
Only Spanish	433/518(83.6)	1.30 (1.04 to 1.62)	1.13 (0.89 to 1.43)
Spanish proficiency			
Not too well/not at all	111/152(73.0)	Ref	Ref
Pretty well/Very Well	348/408(85.3)	1.17 (1.05 to 1.30)	1.10 (0.99 to 1.21)
Length of Residence in urban area			
≤30 years	235/274(85.8)	Ref	Ref
>30 years	224/285(78.6)	0.92 (0.85 to 0.99)	1.00 (0.87 to 1.04)

* Adjusted for age, sex, multideprivation index, education, and current smoking. Results in bold: p<0.05

Table 3
Cross-sectional association between baseline surrogates of acculturation and baseline alcohol consumption in subgroups of rural-to-urban migrants defined by sex and age at migration. The PERU MIGRANT Study, 2007-2013.

	Sex*				Age at migration†			
	Women		Men		<15 years old		≥15 years old	
	n/N (%)	PR (95% CI)	n/N (%)	PR (95% CI)	n/N (%)	PR (95% CI)	n/N (%)	PR (95% C
Language preference on radio								
Quechua/Quechua or Spanish	157/209(75.1)	Ref	162/192(84.4)	Ref	147/182(80.8)	Ref	147/182(80.8)	Ref
Only Spanish	66/79(83.5)	1.07 (0.95 to 1.22)	72/78(92.3)	1.06 (0.97 to 1.15)	86/98(87.8) 1.09 (0.99 to 1.20)	47/53(88.7)	1.08 (0.95 to	
Language spoken at home								
Quechua/Quechua or Spanish	17/31(54.8)	Ref	12/14(85.7)	Ref	5/11(45.5)	Ref	24/34(70.6)	Ref
Only Spanish	209/261(80.1)	1.31 (0.93 to 1.88)	224/257(87.2)	0.87 (0.67 to 1.12)	254/308(82.5)	1.68 (0.88 to 3.21)	173/204(84.8)	1.02 (0.80 to
Spanish proficiency								
Not too well/Not at all	67/101(66.3)	Ref	44/51(86.3)	Ref	49/68(72.1)	Ref	61/83(73.5)	Ref
Pretty well/Very well	157/189(83.1)	1.21 (1.03 to 1.42)	191/219(87.2)	0.98 (0.88 to 1.08)	209/250(83.6)	1.10 (0.94 to 1.29)	134/153(87.6)	1.12 (0.97 to
Length of Residence in urban area								
≤30 years	117/140(83.6)	Ref	118/134(88.1)	Ref	108/124(87.1)	Ref	126/149(84.6)	Ref
>30 years	108/150(72.0)	0.92 (0.80 to 1.07)	116/135(85.9)	0.97 (0.88 to 1.08)	151/194(77.8)	1.00 (0.88 to 1.15)	71/89(79.8)	0.96 (0.82 to

* Subgroup analysis by sex were adjusted for age, deprivation index, education, and current smoking.

† Subgroup analysis by age at migration was adjusted by age, sex, deprivation index, education, and current smoking.

fore included in the longitudinal analyses. None of the acculturation surrogates showed an association with the onset of alcohol consumption in crude or adjusted analyses (Table 4).

Discussion

We evaluated a well-defined group of rural-to-urban migrants in Peru with an average of 30 years of migration and classified them according to several surrogates of acculturation, such as language preference on radio, language spoken at home, Spanish proficiency, and length of residence in urban area. We found no evidence of an association between surrogates of acculturation and alcohol consumption in our main cross-sectional and longitudinal analyses. Our subgroup analysis by sex showed that highly acculturated female migrants, in terms of Spanish proficiency, were more likely to report higher rates of alcohol consumption than non-aculturated women.

Our cross-sectional results did not show an association, which contrast with the findings from a study involving Mexican rural-to-urban migrants (Pinedo et al., 2014) that showed an association between language-related variables and alcohol consumption. Additionally, studies performed in an international migration context have found an association between Spanish proficiency (Alaniz et al., 1999, Pearson et al., 2009, Epstein et al., 2000, Marín and Posner, 1995) and length of residence in an urban area (Faber et al., 1986, Li and Wen, 2015) with alcohol consumption. Although the association between language preference on radio and alcohol consumption has not been evaluated, our acculturation surrogates have been factored into other acculturation scales that have shown association with alcohol consumption (Marín and Posner, 1995, Caetano, 1987, Caetano and Clark, 2003). In our study, migrants who scored higher in the language-related acculturation surrogates were more likely to engage with alcohol consumption in the crude models, but these estimates attenuated in the adjusted models, one potential explanation being related to our limited sample size. Our results

Table 4
Longitudinal association between baseline surrogates of acculturation and onset of alcohol consumption in a 5-years follow-up in rural-to-urban migrants. The PERU MIGRANT Study, 2007-2013.

Surrogates of acculturation	Onset of alcohol consumption		
	n/N (%)	Crude RR (95% CI)	Adjusted* RR (95% CI)
Language preference on radio			
Only Quechua/Quechua or Spanish	23/73(31.5)	Ref	Ref
Only Spanish	5/13(38.5)	1.22 (0.56 to 2.64)	1.30 (0.61 to 2.79)
Language spoken at home			
Only Quechua/Quechua or Spanish	3/13(23.1)	Ref	Ref
Only Spanish	26/74(35.1)	1.52 (0.54 to 4.33)	1.93 (0.63 to 5.88)
Spanish proficiency			
Not very well/Not at all	15/36(41.7)	Ref	Ref
Pretty well/ Very Well	14/51(27.5)	0.66 (0.36 to 1.19)	0.49 (0.23 to 1.05)
Length of Residence in urban area			
≤30 years	11/31(35.5)	Ref	Ref
>30 years	17/55(30.9)	0.87 (0.47 to 1.62)	0.85 (0.43 to 1.97)

* Adjusted by age, deprivation index, education and current smoking.

also showed that rural-to-urban migrants with a higher length of residence in the urban area of Lima, those 'more' acculturated, showed to be less likely to engage in alcohol consumption than non-accultured migrants in the crude analysis, an observation that was in the opposite direction than the language-related acculturation surrogates, however, this attenuated in adjusted analysis. This observation suggests that acculturation would not necessarily increase given longer periods in contact with an urban area. Although long-term migrants would be expected to have higher rates of alcohol consumption, as a result of acculturation, other mechanisms could increase alcohol consumption in short-term migrants, such as coping strategies to the stress of adaptation (Ehlers et al., 2009).

In subgroup analyses by sex, highly acculturated women, as per Spanish proficiency, showed higher rates of alcohol consumption than their non-accultured counterparts, and these findings are corroborated by previous studies in contexts of international migration (Zemore, 2007, Alaniz et al., 1999, Pearson et al., 2009, Marin and Posner, 1995). As a potential explanation, it is known that women in some rural contexts have lower rates of alcohol consumption than men, a difference that may be less in urban contexts, and therefore women may end up 'more affected' than men by the exposure to urban drinking norms and showing, later on, higher levels of adoption behaviors of alcohol consumption as a result of acculturation Caetano and Clark (2003). The fact that Spanish proficiency was the only acculturation surrogate that showed a relationship with alcohol consumption may indicate a better performance of this proxy to assess acculturation. Indeed, as reported previously, the acculturation process is markedly facilitated among migrants with more proficiency with the host language in comparison to those less proficient, even if they share the same ethnicity or culture (Schwartz et al., 2010).

In subgroup analyses by age at migration, we did not find clear a clear pattern of associations between acculturation and alcohol consumption. However, people that migrated at younger ages, i.e. <15 years old, showed higher rates of alcohol consumption. This observation could be partly explained by the early adoption of certain urban practices and behaviors where alcohol consumption is much more common (Kimbro, 2009, Caetano and Clark, 2003), compounded with an exposure in to negative behaviors in early and critical periods of life, including childhood and adolescence.

Our longitudinal analyses did not show evidence of an association between acculturation and the onset of alcohol consumption. These results should be cautiously interpreted, as most of the migrants of the PERU MIGRANT study had spent a considerable amount of time living in an urban area, i.e. almost 30 years (Miranda et al., 2009), so their customs and patterns of behavior could be more es-

tablished than in short-term migrants. In addition, the effect of acculturation on alcohol consumption in our population may have not been detected given our limited sample size for this analysis (n = 88). Conversely, migrants acculturated by Spanish proficiency seem to be less likely to initiate alcohol consumption, and this observation suggests additional pathways in the relationship that could be further evaluated.

Some limitations and strengths of the study deserve attention. Tools to measure acculturation are not available for the rural-to-urban migration context. However, the language-related surrogates of acculturation included were markedly higher in the urban group than the migrant and rural groups, corroborating their value as indicators of acculturation. Alcohol consumption was evaluated through self-report and did not include information about the frequency or the volume of alcohol consumption. However, this study constitutes an initial attempt to investigate the influence of acculturation on alcohol consumption patterns in rural-to-urban migrants. Regarding the population of study, we only included migrants from a specific rural group, and it may well be the case that the direction and the magnitude of the association may be different in other rural-to-urban migration contexts. In addition, rural-to-urban migrants in our study have an average of 30 years of length of residence in the urban area, and this does not allow us to extrapolate our results to short-term migrants where the association of interest, acculturation and alcohol consumption, could be influenced by other factors including the stress of adapting to the early phases of migration (Lee et al., 2013). Finally, the small sample size does not afford a detailed exploration of acculturation, particularly in sub-group and longitudinal analyses. Despite these limitations, this study sheds important insights to evaluate the relationship between acculturation and alcohol consumption in the Latin American context, particularly among the understudied group of rural-to-urban migrants. As such, it will allow for the design and implementation of newer studies, for example, those directed to prevent the onset of alcohol consumption habits among rural-to-urban migrants, particularly in women, where the evaluation of language-related acculturation could benefit the design of interventions.

In summary, among rural-to-urban Peruvian migrants, language-related surrogates of acculturation, including Spanish proficiency, Spanish preference on the radio, language spoken at home, and length of residence in urban area, were shown to be associated with alcohol consumption in crude but not in adjusted analyses. The subgroup analyses, as per age at migration, and the longitudinal analyses did not show an association between acculturation surrogates and alcohol consumption or its onset. In subgroup analyses by sex, however, highly acculturated women, as per Spanish proficiency, showed higher rates of alcohol consumption.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jmh.2020.100015](https://doi.org/10.1016/j.jmh.2020.100015).

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