Alcohol's harm to others and subjective well-being:

Cross-sectional studies in Lao PDR and Thailand

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Abstract:

Objective: Previous studies have confirmed that the number of heavy drinkers in a household negatively correlates with the subjective well-being of individuals in the household. However, limited studies have investigated the experiences of alcohol's harm to others (HTO) and subjective well-being, particularly in low- and middle-income countries (LMICs). The purpose of this study was to investigate the associations between experiences of HTO and subjective well-being in two selected LMICs.

Design and Methods: We analysed population survey data on 1,205 and 1,491 individuals aged 18-64 years from Lao People's Democratic Republic (Lao PDR) and Thailand, respectively. The respondents' experiences of HTO and their subjective well-being were measured using face-to-face interviews. The association between experiencing HTO and subjective well-being was investigated using Tobit regression models.

Results: A significant association between experiencing HTO and subjective well-being was found in Thailand, but not in Lao PDR. Those who had ever experienced HTO had a 2.77-point lower score of subjective well-being than those who had never experienced HTO (95% CI=-4.67, -0.88; p-value<0.05) in Thailand. In Lao PDR, the physical harm dimension showed the strongest association with subjective well-being compared to other types of harm, while in Thailand, financial harm was the dimension most strongly associated with the outcome.

Discussion and Conclusions: There was a significant association between HTO and subjective well-being, particularly physical harm in Lao PDR and financial harm in Thailand. The study suggests that services to mitigate the impacts of HTO on well-being should focus on physical harm in Lao PDR and financial harm in Thailand.

Keywords: alcohol's harm to others, subjective well-being, Lao PDR, Thailand

Introduction

Alcohol's harm to others (HTO) is an alcohol-related harm experienced by individuals and is determined from the perspective of those affected by the drinker rather than from the perspective of the drinker [1, 2]. It portrays alcohol-related problems that not only occur among drinkers but other people around them. Drinkers interact with others who they come into contact with such as family members, friends, co-workers and even strangers [1]. The harms may occur in different ways such as psychological harms, physical harms, financial harms, social harms [3, 4], each of which may have a tremendous negative impact on the well-being and quality of life both the short and long terms.

Subjective well-being attempts to measure experiences in different forms or domains of life in a subjective manner. These domains of life determine an individual's level of happiness, including achievements, relationships with others, material conditions and health [5]. Subjective well-being measures life in different domains, beyond physical and mental health.

There are a limited number of studies determining the association between HTO and subjective well-being. Previous studies mainly focused on the number of heavy drinkers living inside and outside a household and the subjective well-being of an individual in the household. Mixed findings have been reported in relation to the association between the number of heavy drinkers living inside and outside a household and subjective well-being. For example, a study from Chile and Thailand reported that having heavy drinkers inside the household is associated with reduced subjective well-being; however, studies from Lao PDR and Australia were inconclusive [6, 7]. Furthermore, findings from a systematic review found that intimate partner violence, as a result of

alcohol use [8], is associated with mental health problems [9], one of the domains of subjective well-being.

Limited numbers of studies have investigated the experiences of HTO and subjective well-being, particularly in low and middle-income countries (LMICs). The objective of the present study is to examine the association between experiencing alcohol's harm to others and subjective well-being in Lao PDR and Thailand as examples for LMICs. We hypothesize that those who ever experience HTO in different dimensions are associated with a reduction of subjective well-being.

Situation of alcohol consumption in Lao PDR and Thailand

From the Global Status Report on Alcohol and Health 2014, approximately half of Laotians were current drinkers (48%), and about one-third of them were heavy episodic drinkers (30%), whereas in Thailand, about one-third of Thais were current drinkers (30%), and less than five percent were heavy episodic drinkers (4%) [10].

Method

Samples and study design

We analyzed data from two nationally representative surveys in Lao PDR and Thailand, which used the tool from the WHO/ThaiHealth International Collaborative Research Project (hereafter called the WHO-ThaiHealth project) [11]. Data collection was undertaken in November 2012 in Lao PDR and between September 2012 and March 2013 in Thailand. The data were collected using face-to-face interviews and the surveys used a multi-stage cluster sampling technique. The age range of respondents was 15-64 years in Lao PDR and 18-70 years in Thailand. The total number of respondents was 1,257 in Lao PDR and 1,695 in Thailand (response rates of 99.8% and

94.0%, respectively). More details of the study design and data collection of the two surveys can be found elsewhere [12].

To allow for a comparison between the two countries, only respondents aged between 18 and 64 years were included in this analysis (n=1,212 in Lao PDR and n=1,571 in Thailand). After excluding respondents with missing data in the main variables of interest, the analytical sample sizes for both countries were 1,205 in Lao PDR and 1,491 in Thailand.

The studies were approved by the National Committee for Health Research in Lao PDR on October 25, 2012 and the Ethics Committee of Institute for the Development of Human Research Protection in Thailand on September 12, 2012. Informed consent was signed by all participants and all respondents were informed about the objectives and their rights to withdraw from the study at any time.

Measures

The tool to measure HTO and subjective well-being was based on a tool from the WHO-ThaiHealth Project and Personal Wellbeing Index (PWI). Back translation was done for both measures[12].

Alcohol's harm to others

Alcohol's harm to others was measured by 27 questions, which is part of a tool developed under the WHO-ThaiHealth Project[11]. Respondents were asked questions related to their experiences in various types of harm due to other people's drinking over the past 12 months. Other people included known drinkers such as family members or friends and unknown drinkers such as strangers. Respondents who responded "yes" to any type of harm were further asked for the frequency of the harm (s) with choices being once, twice and three or more times. The present

study classified these 27 items into five dimensions of HTO, namely psychological harm, social harm, financial harm, property damage, and physical harm. These five dimensions were adapted from previous literature [3] (see 27 items in Table S1).

Subjective well-being

Subjective well-being was measured using PWI. Respondents were asked to rate the state of their well-being over the past 12 months. The PWI contains eight domains of subjective well-being plus one question asking respondents to rate their satisfaction with life as a whole. The eight domains consist of standard of living, health, achievements in life, personal relationships, safety, community connectedness, future security and religion or spirituality. Each domain has a scale ranging from 0 to 10, where 0 means no satisfaction at all and 10 means completely satisfied [5]. During the analysis, the respondents' scores were rescaled to range from 0 to 100. To estimate the overall subjective well-being, the average of all domains was calculated (0 means no satisfaction at all and 100 means completely satisfied).

Covariates

Covariates were included based on previous studies [6, 7, 13]. These include demographic profiles of respondents, their area of residence, geographical region of residence, respondents' drinking patterns and the number of heavy drinkers living inside and outside their household. Demographic variables included age (in years), gender, marital status (single, married and widowed, divorced or separated), educational achievement (lower than primary school, primary school, secondary school, and college or higher degree), employment status (unemployed, employed with unskilled work, employed with skilled work, studying, and other (e.g. retired) and monthly individual income. Income was categorized into quintiles ranging from Q1 (poorest) to Q5 (richest), and those who did not respond to the income question were coded into a non-response category. Area of

residence included urban (municipal areas) and rural (nonmunicipal areas). Geographical region included north, central and south for Lao PDR and north, northeast, central, south and Bangkok for Thailand. Respondents' drinking pattern was derived from two variables, frequency of alcohol consumption and frequency of heavy drinking, defined as consuming more than five standard alcoholic drinks or 50g of ethanol in one drinking occasion over the past 12 months. These two variables were subsequently combined and categorized into four drinking patterns: 1) non-drinker (never consumed alcohol), 2) current but not heavy drinker, 3) occasional (less than weekly) heavy drinkers, and 4) regular (at least weekly) heavy drinkers. Respondents were asked to identify heavy drinkers with whom they had come into contact with over the past 12 months and asked whether those drinkers lived in the same or another household as themselves. From this question, the number of heavy drinkers living inside and outside the households was estimated.

Statistical analysis

The datasets of both countries had less than 10% missing data; therefore, a complete case analysis was performed [14, 15]. Both countries employed complex multi-stage survey designs, therefore, sampling weights were applied in all inferential analyses in order to account for sampling design and to allow the analysis to be nationally representative.

Evaluating measurement of alcohol's harm to others using confirmatory factor analysis

Confirmatory Factor Analysis (CFA) was applied in the present study to test the validity of the county-specific HTO measurement based on a previous study[3]. This was done in order to validate categorization of HTO in the four different domains (psychological harm, social harm, economic harm, and physical harm); see analysis methods in the supplementary file for more detail.

Association between alcohol's harm to others and subjective well-being

We categorized respondents into two main groups based on the number of harms experienced: those who reported at least one type of harm and those who did not experience any harm.

To investigate the association between experiencing HTO (overall and among the different types) and subjective well-being, two statistical methods were used. First, as the PWI scores are not normally distributed, the Mann-Whitney U test was used to investigate the difference in the distributions of scores of PWI between those who had ever experienced HTO and those who had not. Second, the present study applied Tobit regression to investigate the association between subjective well-being and different dimensions of HTO. The Tobit regression was used because PWI scores should be censored at 100 as suggested by the International Wellbeing Group (2013) and the distribution of PWI scores in both countries; especially in Lao PDR, which was mainly concentrated at 100. Tobit regression has been applied in several studies using health status as the outcome [6, 13, 16]. We adjusted potential covariates, including gender, age, marital status, educational attainment, employment status, individual income, area of residence, geographical region, respondents' drinking pattern, and number of heavy drinkers living inside and outside households. Age was centered at the mean to facilitate interpretation of the model coefficients. Two models were generated: one which investigated the association between overall HTO and subjective well-being and one which investigated the association between type-specific HTO and subjective well-being, both models being adjusted for the previously mentioned covariates. Based on a previous study, we found that heavy drinkers were more likely to experience HTO than non-heavy drinkers [2, 17]; therefore, we tested for an interaction effect between respondent's drinking patterns and different the types of harms in both countries. We included interaction terms with a

significant effect on the associations between HTO and subjective well-being, which were physical harm and financial harm in Thailand.

We conducted a sensitivity analysis by generating an overall HTO variable in two approaches. First, we generated the overall HTO variable from the CFA scores and categorized those who experienced HTO into different severity tertiles (low, moderate and high). Second, we computed the overall HTO variable from the total number of HTO items and classified respondents into three groups (0: respondents who had never experienced any HTO, 1: respondents who had experienced one type of HTO, and 2: respondents who had experienced at least two types of HTO). We later investigated the association between overall HTO and subjective well-being controlling for potential covariates as mentioned earlier.

All descriptive, univariate analyses and Tobit regression were performed using Stata version 12. Confirmatory factor analysis was conducted using Mplus version 8.

Results

Prevalence of alcohol's harm to others

The prevalence of respondents experiencing any HTO was 38% in Lao PDR and 83% in Thailand. Psychological harm was most prevalent whereas physical harm was least prevalent in both countries. Reported experiencing HTO in Thailand was higher than Lao PDR in all types of harm (Table 1). More details of the prevalence of HTO and characteristics of all respondents are shown in Supplemental Table S2.

Evaluation of measurement of alcohol's harm to others

According to the confirmatory factor analysis, we confirmed the validity of measurements of alcohol's harm to others across the different dimensions for both countries. We found that the economic harm dimension consisted of two dimensions: financial harm and property damage. Therefore, five dimensions of HTO emerged in the present study: namely psychological harm, social harm, financial harm, property damage, and physical harm. Details of the CFA are shown in the Supplemental files (Figure S1-S4 and Table S3).

The association between experiencing alcohol's harm to others and subjective well-being

From the univariate analysis, in Lao PDR there were significant differences in subjective well-being between those who had experienced at least one type of harm and those who never experienced any harm. Those who had experienced at least one type of harm had a lower median PWI score compared to their counterparts (82.50, interquartile range (IQR): 76.25, 90.00 vs 85.00, IQR: 76.25, 92.50). However, no difference was found for respondents in Thailand. Disaggregation by type of harm uncovered three main similarities for the association between HTO and subjective-well-being. First, in both countries, there were no significant differences in the PWI scores between those who had experienced psychological harm and those who had not. Second, in both countries, those who had experienced social harm, financial harm or physical harm had a significantly lower PWI score than those who never experienced any of these harms (p-value<0.05). Third, in both countries, no association was found between experiencing property damage and PWI score (Table1 and Table S4 in the supplementary files).

Insert Table 1

In the multivariable analysis, respondents from Thailand who experienced at least one type of harm had a lower PWI score. Those who experienced any type of HTO had a 2.77-point lower score of

PWI than those who never experienced any type of HTO (95% CI: -4.67, -0.88; *p*-value<0.05). However, there were no statistically significant differences in PWI score between those who had experienced any type of HTO and those who had never experienced any in Lao PDR (Table 2).

Insert Table 2

When considering the associations between HTO in each dimension and subjective well-being, all types of harm, except psychological harm and physical harm, were associated with PWI in Thailand. In Lao PDR, we found two types of harms associated with subjective well-being. On the one hand, physical harm was negatively associated with subjective well-being (β=-3.82; 95% CI: -6.64, -1.00; *p*-value<0.05). One the other hand, we found a positive association between experiencing psychological harm and subjective well-being, indicating that those who experienced psychological harm had a higher score than those who never experienced psychological harm (β=2.17; 95% CI: 0.73, 3.61; *p*-value<0.05) (Table3).

In Thailand, the association between financial harm and subjective well-being was the strongest compared to other types of harms, with a coefficient of -6.01 (95% CI: -8.50, -3.51; *p*-value<0.05). In general, the magnitudes of the associations between HTO and subjective well-being in Thailand were greater than in Lao PDR for any type of harm (Table2 and Table 3).

After controlling for other covariates and different types of harms, presence of a heavy drinker inside a household was associated with reduced subjective well-being, but this association was significant only in Thailand (Table3).

Insert Table 3

In the sensitivity analysis, after classifying respondents who experienced HTO into tertiles using the CFA scores, we found that Thai respondents who experienced moderate- and high- levels of HTO had lower PWI score (β=-2.20, 95% CI: -3.95, -0.44; p-value<0.05 and β=-4.17, 95% CI: -5.99, -2.34; p-value<0.05, respectively) compared with those who had low levels of HTO. Similar findings were found when we applied the total number of harms that respondents had experienced (Table4)

<div style="border:1px solid;display:inline-block;padding:10px;">Insert Table 4</div>

Discussion

There are several main findings regarding the main objective. The findings confirm our hypothesis that respondents who experienced HTO were associated with a reduction of subjective well-being in Thailand, but not in Lao PDR. When considering the association in different types of harms, the associations vary. The associations between social harm, financial harm, and property damage, with subjective well-being were found only in Thailand, not in Lao PDR. Psychological harm was found to have a positive effect on well-being in Lao PDR, but the association was not significant in Thailand. Furthermore, physical harm was significantly associated with subjective well-being in Lao PDR only, not in Thailand. In Lao PDR, physical harm had the strongest association with subjective well-being, while in Thailand financial harm had the strongest association. In addition, the associations between all types of harms and subjective well-being were stronger in Thailand than in Lao PDR.

The present study illustrated that the overall effects of HTO and subjective well-being vary across countries. In Thailand we found a negative effect of experiencing HTO on subjective well-being, but not in Lao PDR. The present study is the first study investigating the overall effect of HTO on

subjective well-being. One previous study determined the effects of exposure to heavy drinkers only, living inside or outside households [7]. This study provides greater detail than the previous study by identifying types of harms that affect subjective well-being the most.

The present study found that in Lao PDR, physical harm was significantly associated with subjective well-being, whereas in Thailand the association was not significant. An explanation for this result may be related to the availability of social services. In Thailand residents have access to the One Stop Crisis Centre, an organization that provides services for victims of harm, particularly physical harm and sexual abuse from substance use including alcohol consumption. This organization provides medical services and psychological support and services across the whole country [18]. Utilization of this service may cushion the harms caused by alcohol consumption. However, this type of organization is not available in Lao PDR. Moreover, a previous study suggested that 23% of people who experienced physical harm in Thailand seek help from health care services, while in Lao PDR the figure was only 1% [19]. This may explain the differences in the association between experiencing physical harm and subjective well-being between the two countries.

Financial harm had the most severe effect on subjective well-being in Thailand while in Lao PDR it was physical harm. The explanation for this could be differences in country contexts. The possible explanation why the association between financial harm and subjective well-being was greater in Thailand than in Lao PDR is related to the different lifestyles of people between the two countries; Thais' lifestyles are more urbanized than in Lao PDR. World Bank reported that the proportion of those who live in urban areas is almost half of the total population in Thailand, where Lao PDR accounted for about one-third of the population in 2012 [20]. Those who live in rural areas may have other determinants that influence their well-being aside from their financial

situation. However, in Thailand where people are more individualistic and live in urban areas, the financial situation may be one of the most essential factors for determining subjective well-being. As a result, the magnitude of the association between financial problems due to drinking of others and subjective well-being was greater in Thailand than in Lao PDR.

The magnitudes of the association between HTO and subjective well-being were greater in Thailand than in Lao PDR for all types of harm. An explanation for this may be that the prevalence of alcohol consumption and the prevalence of heavy drinkers in Lao PDR are greater than in Thailand [10]. Therefore, in a culture where drinking is acceptable for most of the population, some types of harm may be accepted [21]. For example, in Lao PDR the association between experiencing psychological harm was positively associated with subjective well-being. In Thailand however, the association between psychological harm was not statistically significant. With high prevalence of drinkers; therefore, Laotians tend to experience more harm, but they may not perceive as a problem. As a result, some types of harms such as psychological harm does not have negative effects on subjective well-being in Lao PDR, but positive effect instead.

Limitations of the study

There are some limitations of this study that should be acknowledged. First, the study used cross-sectional survey data, thus causal relationships cannot be ascertained. Second, the study relied on information collected through self-reported face-to-face interviews. Therefore, reporting bias may be present, both for the exposures and the outcome. Underreporting of HTO and over-reporting of subjective well-being has been shown to exist from a previous study [13]. The effect of HTO may therefore have been over- or under-estimated. Third, the study may have been affected by residual confounding: there may be some important confounders that the survey did not collect such as respondents' health conditions and other social determinants of health and psychological and

behavioral determinants of health such as smoking and level of stress. Furthermore, the present study did not test the validity of subjective well-being across the two countries; cultural differences among these countries might affect the validity of subjective well-being scores.

Conclusions

Overall, the present study found that the effect of experiencing harms from drinkers on subjective well-being varies across different types of harms and countries. In Thailand, experiencing all types of harms, except physical harms and psychological harms are associated with a reduction of subjective well-being, whereas in Lao PDR a negative effect of experiencing harms on subjective-well-being only found among those who experienced physical harm. The findings suggest that the governments of Lao PDR and Thailand should design interventions tailor-made to people who experience specific types of harms in order to improve subjective well-being.

Acknowledgments

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Table1. *Univariate analysis to investigate the association between experiencing alcohol's harm to others and PWI score in Lao PDR and Thailand*

Dimensions of HTO		%[a]	n	PWI (IQR)[b]	*p*-value[c]	%[a]	n	PWI (IQR)[b]	*p*-value[c]
				Lao PDR				**Thailand**	
Overall (Any	Yes	37.89	484	82.50 (76.25, 90.00)	**0.006**	83.34	1190	78.75 (68.75, 87.50)	0.186
HTO)	No	62.11	721	85.00 (76.25, 92.50)		16.66	301	80.00 (70.00, 88.75)	
Psychological harm	Yes	34.95	434	83.75 (76.25, 90.00)	0.118	81.43	1155	78.75 (68.75, 87.50)	0.243
	No	65.05	771	85.00 (75.00, 92.50)		18.57	336	78.75 (70.00, 88.75)	
Social harm	Yes	11.33	135	81.25 (75.00, 88.75)	**0.047**	52.34	837	77.50 (67.50, 86.25)	**<0.001**
	No	88.67	1070	83.75 (76.25, 91.25)		47.66	654	80.00 (70.00, 88.75)	
Economic harm	Yes	8.74	129	80.00 (72.50, 87.50)	**<0.001**	27.91	333	77.50 (65.00, 86.25)	**0.016**
	No	91.26	1076	85.00 (76.25, 91.25)		72.09	1158	78.75 (70.00, 87.50)	
Financial harm	Yes	4.92	74	79.38 (71.25, 86.25)	**<0.001**	18.10	205	76.25 (63.75,85.00)	**0.002**
	No	95.08	1131	85.00 (76.25, 91.25)		81.90	1286	78.75 (70.00, 87.50)	
Property damage	Yes	4.62	68	80.63 (75.00, 88.75)	0.075	14.85	191	78.75 (67.50, 86.25)	0.211
	No	95.38	1137	83.75 (76.25, 91.25)		85.15	1300	78.75 (70.00, 87.50)	
Physical harm	Yes	5.43	81	78.75 (72.50, 86.25)	**<0.001**	8.01	99	75.00 (63.75, 85.00)	**0.009**
	No	94.57	1124	85.00 (76.25, 91.25)		91.99	1392	78.75 (70.00, 87.50)	

[a]Prevalence of harms in each dimension in Lao and Thai population, which is based on weighted analysis;
[b]PWI = median scores of Personal Well-being Index, IQR= Interquartile Range;
[c]Levels of statistical significance from Mann-Whitney U test : *p*-value<0.05

Table2. *Multivariable analysis to investigate the association between overall alcohol's harm to others and PWI scores, using Tobit regression*

Variables	Lao PDR		Thailand	
	[a]Coef.(95%CI)	*p*-value	[a]Coef.(95%CI)	*p*-value
[b]HTO in overall (vs. No)	1.14 (-0.15, 2.44)	0.084	-2.77 (-4.67, -0.88)	0.004
Female (vs. male)	0.59 (-0.70, 1.87)	0.368	0.47 (-1.06, 2.01)	0.545
Age (centering)	-0.01 (-0.06, 0.05)	0.860	0.03 (-0.04, 0.10)	0.467
Educational level (vs. lower than primary school)				
Primary school	0.86 (-2.47, 4.20)	0.612	2.10 (-4.55, 8.75)	0.536
Secondary school	2.65 (-0.67, 5.97)	0.118	-0.29 (-7.03, 6.45)	0.933
College or higher	4.29 (0.64, 7.95)	0.021	2.94 (-3.90, 9.78)	0.399
Income quintiles (vs. Q1)				
Q2	0.95 (-1.08, 2.98)	0.359	2.73 (0.52, 4.93)	0.016
Q3	0.43 (-1.49, 2.35)	0.663	3.98 (1.74, 6.22)	0.001
Q4	3.73 (1.52, 5.93)	0.001	4.22 (1.82, 6.63)	0.001
Q5	3.61 (1.51, 5.71)	0.001	6.81 (3.96, 9.66)	<0.001
Non-response	-3.59 (-19.11, 11.94)	0.650	4.11 (0.81, 7.42)	0.015
Employment status (vs. unemployment)				
Employed, unskilled work	-2.17 (-4.30, -0.04)	0.046	-1.16 (-3.63, 1.32)	0.360
Employed, skilled work	0.97 (-1.21, 3.16)	0.381	-1.67 (-4.22, 0.87)	0.197
Studying	4.31 (0.61, 8.01)	0.022	8.57 (4.52, 12.62)	<0.001
Retired	-0.45 (-3.96, 3.05)	0.800	0.24 (-9.14, 9.62)	0.960
Marital status (vs. single)				
Married	2.86 (0.67, 5.06)	0.011	0.55 (-1.28, 2.37)	0.557
Divorce/separated	-1.93 (-4.97, 1.11)	0.213	-4.40 (-7.17, -1.63)	0.002
Area of residence: Rural (vs. urban)	0.82 (-0.46, 2.09)	0.209	0.12 (-1.53, 1.76)	0.890
Geographical areas (vs. Central for Laos and vs. Bangkok for Thailand)				
North	3.92 (2.47, 5.36)	<0.001	2.06 (-0.80, 4.91)	0.158
[c]Central			-0.58 (-3.24, 2.08)	0.667
South	-3.17 (-4.83, -1.52)	<0.001	3.88 (0.90, 6.86)	0.011
Northeast			2.80 (0.11, 5.49)	0.041
Respondents' drinking pattern (vs. non-drinker)				
<5drinks	0.51 (-1.03, 2.06)	0.513	-0.66 (-2.39, 1.06)	0.449
5+drinks less than weekly	-1.69 (-3.37, -0.01)	0.049	-3.06 (-4.96, -1.16)	0.002
5+drinks weekly	-1.75 (-4.37, 0.86)	0.189	1.97 (-0.56, 4.50)	0.127
Number of heavy drinkers inside households	-0.38 (-0.82, 0.05)	0.086	-3.49 (-4.75, -2.24)	<0.001
Number of heavy drinkers outside households	-0.25 (-1.02, 0.52)	0.524	0.38 (-0.53, 1.29)	0.417
Intercept	76.33 (71.12, 81.53)		73.90 (66.12, 81.67)	

[a]Coefficient of Tobit regression; [b]Alcohol's harm to others in overall; [c]Central region in Thailand does not include Bangkok.

Table3. *Multivariable analysis to investigate the association between different types of alcohol's harm to others and PWI scores, using Tobit regression*

Variable	Lao PDR		Thailand	
	[a]Coef. (95% CI)	*p*-value	[a]Coef. (95% CI)	*p*-value
Different types of HTO (vs. no)				
Psychological harm	**2.17 (0.73, 3.61)**	**0.003**	-0.49 (-2.36, 1.39)	0.611
Social harm	0.52 (-1.54, 2.58)	0.620	**-2.75 (-4.29, -1.21)**	**<0.001**
Financial harm	-2.39 (-5.20, 0.42)	0.095	**-6.01 (-8.50, -3.51)**	**<0.001**
Interaction between financial harm and respondents' drinking pattern			**1.75 (0.20, 3.30)**	**0.027**
Property damage	0.09 (-2.86, 3.04)	0.952	**-2.44 (-4.31, -0.57)**	**0.011**
Physical harm	**-3.82 (-6.64, -1.00)**	**0.008**	3.54 (-0.06, 7.14)	0.054
Interaction between physical harm and respondents' drinking pattern			**-3.26 (-5.79, 0.72)**	**0.012**
Female (vs. male)	0.57 (-0.71, 1.85)	0.380	0.19 (-1.33, 1.72)	0.807
Age (centering)	-0.01 (-0.06, 0.05)	0.853	>-0.01 (-0.07, 0.07)	0.936
Educational level (vs. lower than primary school)				
Primary school	0.92 (-2.40, 4.24)	0.585	2.82 (-3.72, 9.35)	0.398
Secondary school	2.70 (-0.60, 6.00)	0.109	0.71 (-5.92, 7.33)	0.835
College or higher	**4.12 (0.48, 7.75)**	**0.027**	2.08 (-3.65, 9.80)	0.369
Income quintile (vs. Q1)				
Q2	0.84 (-1.18, 2.86)	0.415	1.90 (-0.28, 4.08)	0.088
Q3	0.36 (-1.56, 2.27)	0.715	**2.98 (0.75, 5.21)**	**0.009**
Q4	**3.47 (1.27, 5.67)**	**0.002**	**3.08 (0.67, 5.48)**	**0.012**
Q5	**3.39 (1.30, 5.48)**	**0.002**	**6.40 (3.58, 9.23)**	**<0.001**
Non-response	-4.32 (-19.74, 11.11)	0.583	2.91 (-0.36, 6.18)	0.081
Employment status (vs. unemployment)				
Employed, unskilled work	**-2.20 (-4.32, -0.08)**	**0.042**	-0.55 (-2.99, 1.89)	0.656
Employed, skilled work	0.89 (-1.27, 3.06)	0.419	-0.72 (-3.24, 1.79)	0.573
Studying	**4.29 (0.61, 7.97)**	**0.022**	**8.19 (4.18, 12.20)**	**<0.001**
Retired	-0.47 (-3.95, 3.02)	0.793	1.39 (-7.82, 10.60)	0.767
Marital status (vs. single)				
Married	**2.96 (0.78, 5.14)**	**0.008**	0.46 (-1.36, 2.27)	0.621
Divorce/separated	-1.67 (-4.70, 1.35)	0.279	**-3.76 (-6.51, -1.00)**	**0.008**
Area of residence: Rural (vs. urban)	0.82 (-0.45, 2.09)	0.204	0.42 (-1.21, 2.05)	0.610
Geographical areas (vs. Central for Laos and vs. Bangkok for Thailand)				
North	**4.03 (2.59, 5.47)**	**<0.001**	2.35 (-0.45, 5.16)	0.100
Central[b]			-0.80 (-3.42, 1.82)	0.549
South	**-2.77 (-4.42, -1.11)**	**0.001**	**3.67 (0.73, 6.60)**	**0.014**
Northeast			**2.98 (0.33, 5.63)**	**0.027**
Respondents' drinking pattern (vs. non-drinker)				
<5drinks	0.52 (-1.01, 2.05)	0.506	-0.78 (-2.50, 0.93)	0.370
5+drinks less than weekly	**-1.78 (-3.45, -0.11)**	**0.037**	**-2.84 (-4.83, -0.86)**	**0.005**
5+drinks weekly	-1.59 (-4.20, 1.01)	0.231	1.88 (-0.92, 4.67)	0.188
Number of heavy drinkers inside households	-0.41 (-0.84, 0.03)	0.069	**-2.38 (-3.65, -1.10)**	**<0.001**

Number of heavy drinkers outside households	-0.25 (-1.02, 0.52)	0.525	0.72 (-0.19, 1.63)	0.121
Intercept	76.25 (71.08, 81.43)		73.08 (65.44, 80.73)	

[a]Coefficient of Tobit regression; [b]Central region in Thailand does not include Bangkok.

Table 4. *Sensitivity analysis on multivariable analysis model to investigate association between different levels of alcohol's harm to others and PWI scores, using Tobit regression*

Levels of HTO	Lao PDR		Thailand	
	[a]Coef. (95% CI)	*p*-value	[a]Coef. (95% CI)	*p*-value
Model 1: HTO (vs. low)				
moderate	2.01 (-0.07, 4.09)	0.058	**-2.20 (-3.95, -0.44)**	**0.014**
high	0.84 (-0.57, 2.26)	0.244	**-4.17 (-5.99, -2.34)**	**<0.001**
Model 2: HTO (vs. never experienced HTO)				
1 item of HTO	1.03 (-0.67, 2.73)	0.236	-1.35 (-3.94, 1.24)	0.308
≥ 2 items of HTO	1.23 (-0.30, 2.77)	0.116	**-3.15 (-5.11, -1.20)**	**0.002**

Model 1: using score of confirmatory factor analysis and categorized into HTO tertile; Model 2: using total number items of harms that respondents reported; [a]Coefficient of Tobit regression; the model is adjusted for gender, age, education, income, employment status, marital status, area of residence, geographical locations, respondents' drinking pattern, number of heavy drinkers inside households, number of heavy drinkers outside households

Supplementary material

Table S1. *The measurement of alcohol's harm to others*

Number	Code[a]	Items
		Psychological harm
1.	B	Felt unsafe due to drinking of others in public places
2.	C	Had to stop seeing a person due to their drinking intoxication
3.	D	Felt threatened/afraid when confronted by drinkers in public places
4.	E	Woke up at night/could not sleep due to loud noises from other's drinking
5.	F	Being insulted by drinkers
6.	G	Felt sad or been ignored by drinkers
7.	H	Being passengers with drunk drivers
8.	I	Been harassed or bother at private setting by drinkers
9.	J	Been harassed or disturbed by drinkers in public places
10.	K	Felt threatened or being afraid because of someone's drinking at home or in other private settings
11.	L	Had to leave home without eating anything because of drinking or intoxication of a person in the household
		Social harm
12.	M	Drinkers did not complete their assigned work due to their drinking/intoxication
13.	N	Been negatively affected while attending a social occasion by drinking of known drinkers
14.	O	Had problems with friends or neighbours due to their drinking
15.	P	Had family problems or marriage difficulties due to someone else's drinking
16.	Q	Family members refused to do assigned chores due to their drinking/intoxication
17.	R	Had to avoid socializing with people due to embarrassment towards a person in a household due to their intoxication
18.	S	Had to flee from home due to drinking or intoxication of a person in the households
		Economic harm
		Financial harm
19.	T	Had financial troubles because of someone else's drinking
20.	U	Did not have enough money for household expenses due to the drinking or intoxication of a person in the household
21.	V	Money or other valuables were stolen due to drinkers
		Property damage
22.	W	Drinkers were responsible for a traffic accident you were involved in
23.	X	House, car, or property were damaged
24.	Y	Clothes or other belonging were ruined by drinkers

		Physical harm
25.	Z	Being pushed or shoved by drinkers
26.	AA	Being harmed physically by drinkers
27.	AB	Forced or sexually harassed by drinkers

Note: [a]The code is referred to items of harm in FigureS1-S4,

The Table is adapted from Waleewong et al, 2017

Analysis methods of evaluating alcohol's harm to other measurement by using confirmatory factor analysis

Confirmatory factor analysis

A confirmatory factor analysis (CFA) is an analytical tool to define underlying latent variables from a set of observed variables. It is a theory testing tool that has been developed in the field of psychology and it was applied in the present study to test the theory from existing literature[1] in different settings. The present study was an initial investigation to evaluate the measurement by using the psychometric property model. There were two main advantages of applying CFA. The first advantage is that CFA can allow covariance between observed variables (in the present study, observed variables refer to the items of HTO), which can better reflect pictures regarding the nature of harms because there might be a situation where the items in the same factor are not independents (in the present study, factor refers to a domain or a type of HTO). The second advantage is that after conducting CFA, the researcher is able to estimate factor scores for each domain. The advantage of this is that CFA allows adjustment of weight in different items of harms in the same underlying construct. By that, it means that some items of harm reported a low prevalence while others were common and CFA created a weight score from each item and then estimated the overall score for each individual.

There were six steps of analysis to evaluate the measurements of HTO in different domains by using psychometric property model. In the present study, four domains of HTO, based on previous literatures, were considered, including psychological harm, social harm, economic harm and physical harm[1].

First, to establish whether a set of observed variables share some relationships with underlying constructs, the correlation matrix was applied. There is no criteria judgment of the value of the correlation coefficient. However, the correlation matrix was the first step to investigating interrelationships of observed variables pertaining to underlying domains of harms.

Second, internal consistency or reliability of measurement in each domain was investigated by using Cronbach's alpha. Cronbach's alpha can ensure that observed variables are deemed to measure the same underlying domains. The alpha value of 0.70 is considered as good[2].

Third, constructing a CFA to test the validity of the measurement in each domain, was performed. Weight least squares means and variance was used to handle ordinal variables or frequency of HTO in each item[3]·[4]. The standardised factor loadings were obtained. The criterion of factor loading that was considered good is 0.70[5]. The psychometric models were conducted in two conditions: allowing covariance between residuals of observed variables and without covariance. The modification indices were used to assess potential covariance between observed variables in order to improve the goodness of fit of the models[6].

Fourth, a model assessment was performed in order to evaluate the goodness of a model. Three goodness-of-fit criteria were applied: the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), and the Root Mean Square Error Approximation (RMSEA) index. The X^2 goodness-of-fit was not applied due to the sample size of this study being large[7]. The first criterion is CFI, which

measures the reduction of lack of fit, ranging between 0 and 1. A value greater than 0.95, is considered as a good fit model. The second criterion is TLI which is the index used for correcting the complexity of the model; a value ranging between 0 and 1 and the value close to 0.95 is considered as a good fit model[8]. The present study considered the model as adequate if CFI and TLI were 0.90[7, 9]. The third criterion is RMSEA, which measures the closeness of fit[7], and it is recommended that if value less than 0.05 is considered a model as a good fit[7, 8].

After considering the reliability of each domain, Cronbach's alpha values were lower than thresholds in two domains for both countries, including economic harm and physical harm together with the evaluation of the goodness of fit models. The researcher decided to split economic harm into two factors: financial harm and property damage. However, due to a limited number of items in physical harm domain; therefore, physical harm was considered as one factor. Note that in this step, the researcher decided to keep all items of HTO because the factor loadings of all items show statistically significant, except the item of sexual abuse in Thailand.

Next, the study also investigated the association between factors. It was found that there were high correlations between factors; therefore, a second-order factor was also investigated[10].

Finally, predictions of the factor scores of each model were estimated after conducting CFA. These factor scores were standardized in order to allow for a comparison of the effect of each domain on subjective well-being.

Table S2. *Characteristics of respondents and prevalence of alcohol's harm to others in Lao PDR and Thailand*

Variables		Lao PDR			Thailand		
		% (n=1,205)	Prevalence of HTO (%)[a]	p-value[b]	% (1,491)	Prevalence of HTO (%)[a]	p-value[b]
Gender	Male	41.66	40.04	**<0.001**	40.38	84.26	0.551
	Female	58.34	35.68		59.62	82.47	
Mean (SD) age (years)		40.37(11.87)			40.49(12.88)		
Age group (years)	18-25	14.27	50.10	**0.001**	7.91	90.83	**<0.001**
	26-35	23.65	42.47	**<0.001***	17.30	90.78	**<0.001***
	36-45	27.14	37.49		23.41	82.52	
	46-55	22.74	34.33		30.58	80.74	
	55-64	12.20	23.82		20.79	70.56	
Education	Lower than primary school	4.73	40.91	0.168	2.08	81.91	**0.011**
	Primary school	34.36	31.05	**0.044***	44.74	79.91	**0.009***
	Secondary school	48.63	37.09		29.58	87.00	
	College or higher	12.28	51.93		23.61	84.19	
Individual income	Q1(poorest)	21.41	38.53	0.476	18.91	81.28	0.654
	Q2	19.92	34.89	0.081	18.31	83.85	0.867
	Q3	25.98	34.29		22.47	84.31	
	Q4	12.78	45.91		20.25	83.94	
	Q5(richest)	19.67	38.53		13.01	86.15	
	NR[c]	0.25	57.36		7.04	77.76	
Employment status	Unemployed	13.20	33.53	0.107	12.21	74.86	**0.019**
	Employed, unskilled work	46.64	36.72		39.77	81.63	
	Employed, skilled work	34.36	37.67		44.53	85.99	
	Studying	3.57	60.48		2.68	93.76	
	Others (e.g. retired)	2.24	37.84		0.80	75.49	
Marital status	Single	11.70	55.16	**<0.001**	19.52	83.34	**0.002**
	Married	80.50	36.04		67.87	83.94	
	Divorce/separated	7.80	27.01		12.61	78.93	

Variables		Lao PDR			Thailand		
		% (n=1,205)	Prevalence of HTO (%)[a]	p-value[b]	% (1,491)	Prevalence of HTO (%)[a]	p-value[b]
Living areas	Urban	53.03	41.48	**<0.001**	60.23	81.23	0.572
	Rural	46.97	29.98		39.77	84.42	
Regions	North	34.02	18.44	**<0.001**	19.79	88.72	**<0.001**
	Central [d]	32.02	41.53		20.46	79.56	
	South	33.03	59.47		20.25	68.64	
	Northeast				20.79	90.13	
	Bangkok				18.71	79.59	
Respondents' drinking status	Non-drinkers	25.31	31.38	**<0.001**	54.39	77.19	**<0.001**
	<5drinks	35.77	28.96		20.72	84.30	
	5+drinks less than weekly	33.20	50.81		17.30	90.79	
	5+ drinks at least weekly	5.73	53.80		7.58	93.50	
Heavy drinkers inside households	0	79.09	30.49	**<0.001**	81.56	79.21	**<0.001**
	1	15.27	64.31		16.83	96.10	
	+2	5.64	68.65		1.61	99.91	
Heavy drinkers outside households	0	61.91	29.61	**<0.001**	40.24	68.71	**<0.001**
	1	23.65	48.84		45.74	91.37	
	+2	14.44	66.05		14.02	94.52	

[a]based on weighted analysis,[b]Chi-square test (unless specified otherwise), [c]NR=respondents who did not respond to income question ,
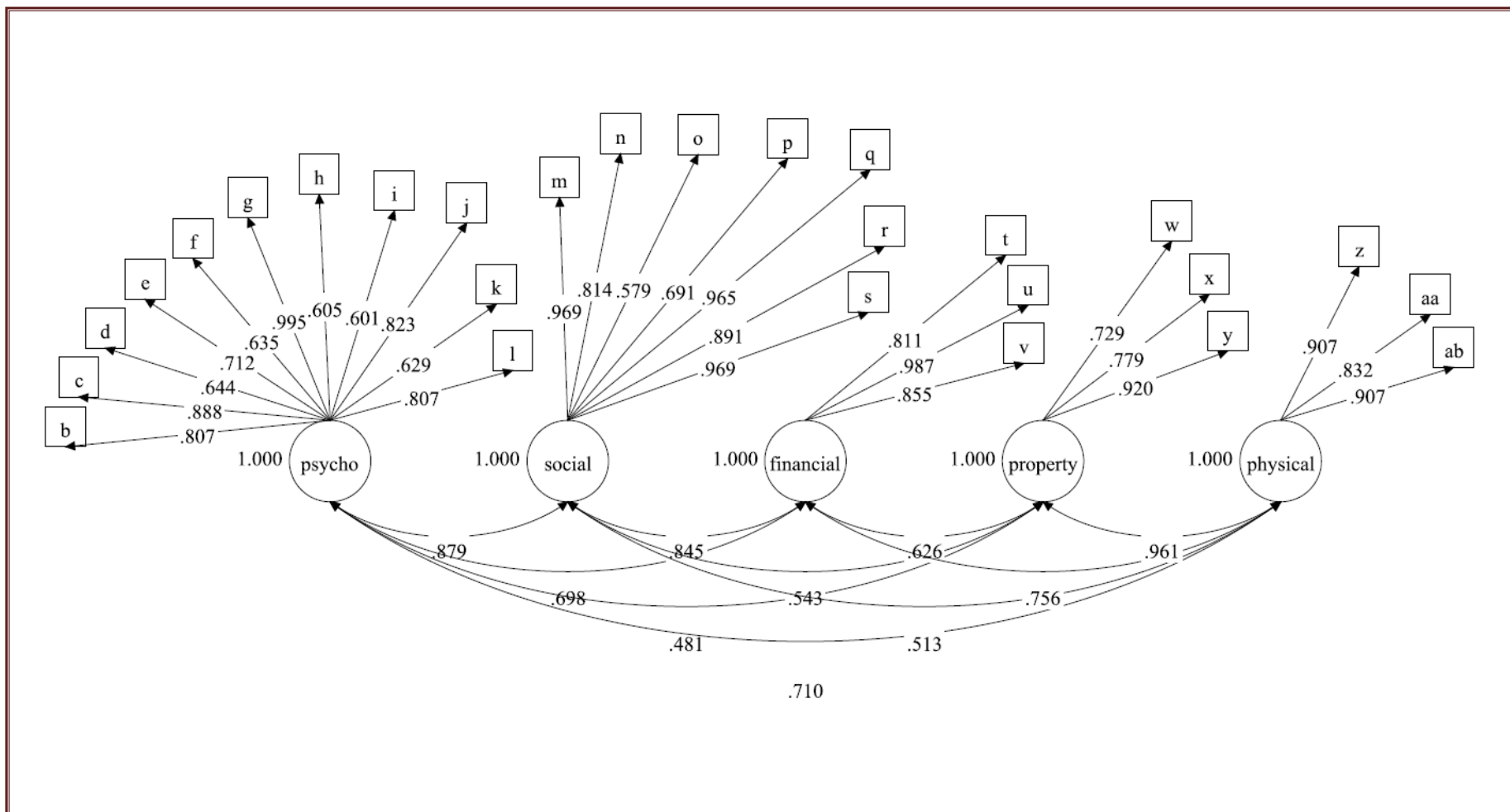[d]Excluded Bangkok,*Chi-square test for trend

 Figure S1. *Primary factor of measurement model of alcohol's harm to others with covariance between factors, with standardised loading in Lao PDR; note for the definition of each code refer to Table S1*

Figure S2. *Primary factor of measurement model of alcohol's harm to others with covariance between factors, with standardised loading in Thailand; note for the definition of each code refer to Table S1*

Figure S3. *Second-order factor of measurement model of alcohol's harm to others with covariance between factors, with standardised loading in Lao PDR; note for the definition of each code refer to Table S1*
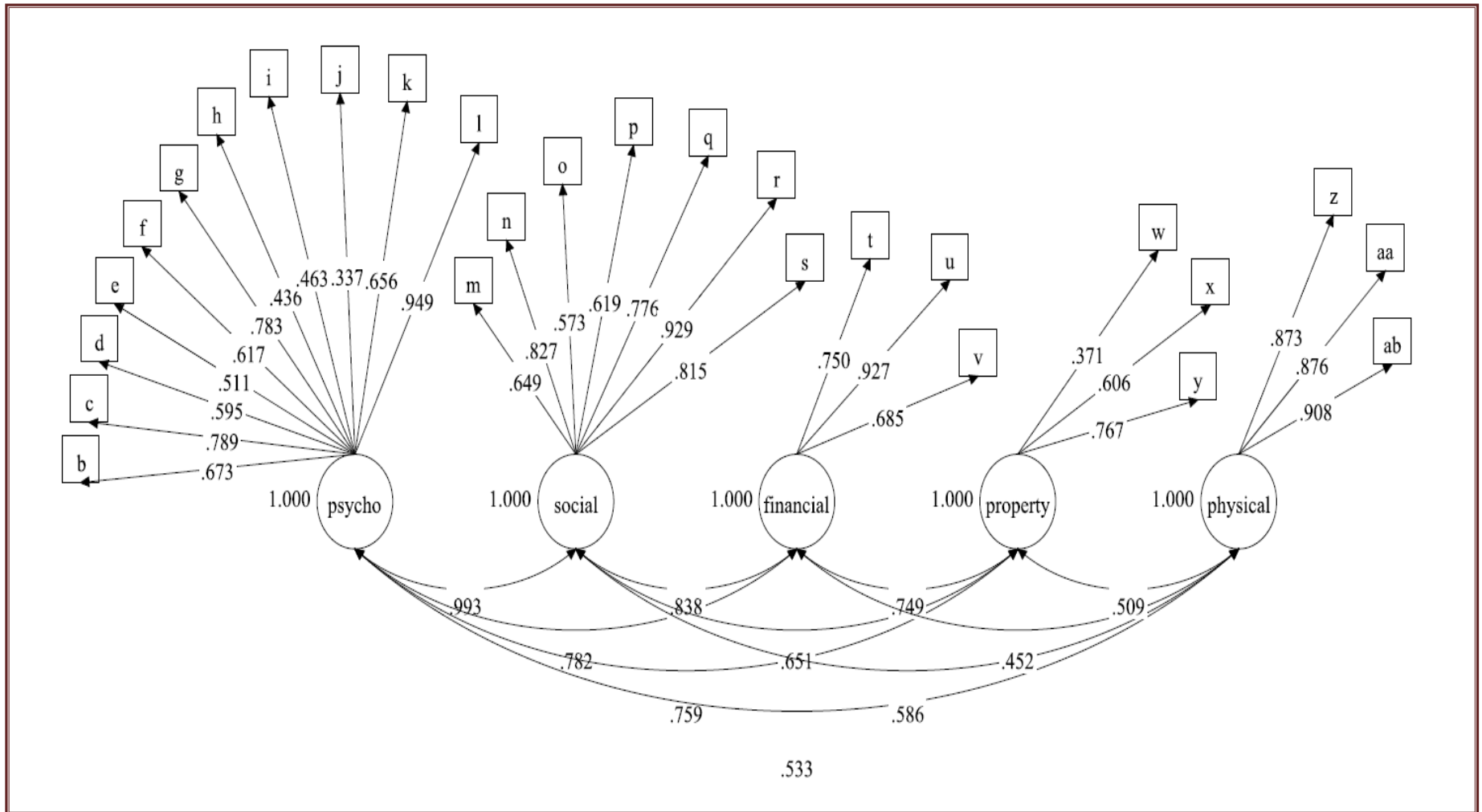
Figure S4. *Second-order factor of measurement model of alcohol's harm to others with covariance between factors, with standardised loading in Thailand ; note for the definition of each code refer to Table S1*
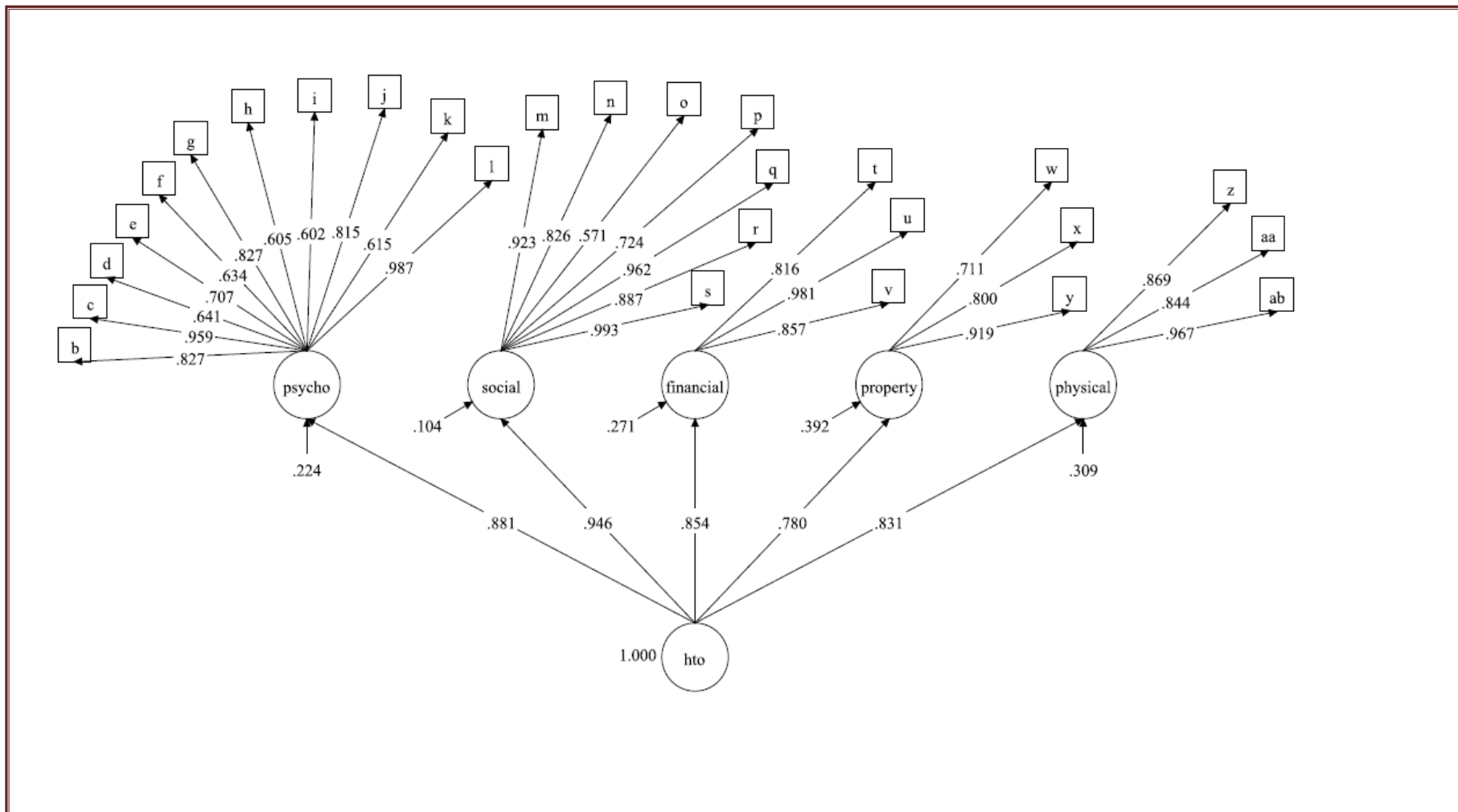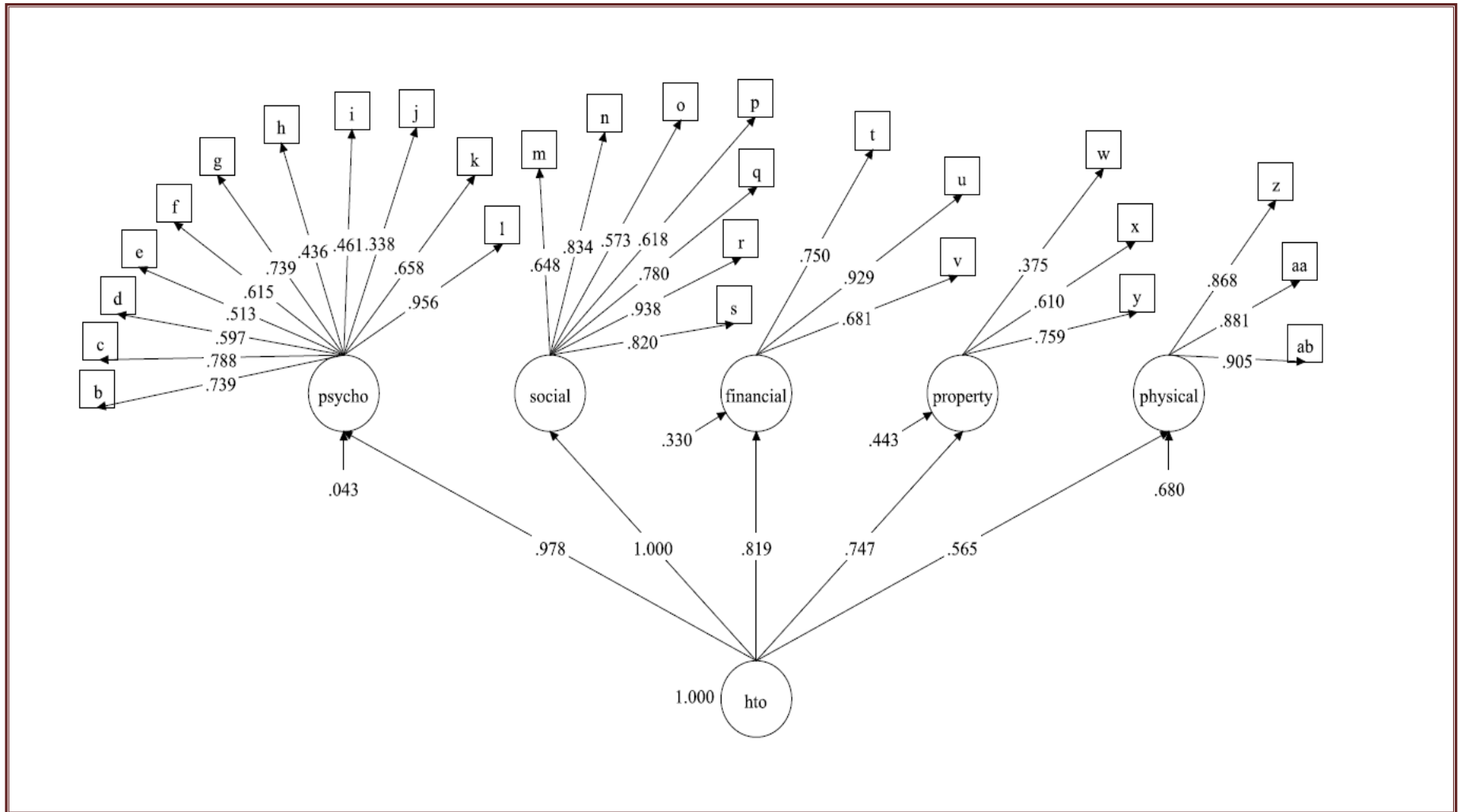
TABLE S3. *Goodness of fit indices for measurements of alcohol's harm to others in Lao PDR and Thailand*

Latent variables	Lao PDR			Thailand		
	TLI	**CFI**	**RMSEA**	**TLI**	**CFI**	**RMSEA**
Psychological harm-one factor	0.870	0.896	0.063	0.884	0.908	0.040
Psychological harm-one factor, with covariance	0.944	0.961	0.041	0.959	0.971	0.024
Social harm-one factor	0.967	0.978	0.045	0.925	0.950	0.035
Social harm-one factor with covariance	0.993	0.996	0.021	0.957	0.975	0.027
Economic harm-one factor	0.839	0.893	0.064	0.791	0.861	0.054
Economic harm-two factors	0.961	0.977	0.031	0.766	0.859	0.057
Economic harm-two factors with covariance	0.967	0.985	0.029	0.863	0.936	0.043
Physical harm-one factor	1.000	1.000	<0.001	1.000	1.000	<0.001
Overall factor together	0.759	0.782	0.046	0.931	0.938	0.018
Second-order factor	0.740	0.763	0.048	0.933	0.939	0.018

Note: TLI=Tucker Lewis Index, CFI=Comparative Fit Index, and RMSEA= Root Mean Square Error Approximation

Table S4. *Univariate analysis on association between demographic profile and Personal Wellbeing Index in Lao PDR and Thailand*

Variables		Lao PDR		Thailand	
		PWI(IQR)[a]	p-value[b]	PWI(IQR)[a]	p-value[b]
Gender	Male	83.75 (76.25,90.00)	**0.259**	78.75 (68.75,87.50)	0.747
	Female	83.75 (76.25,92.50)		78.75 (70.00,87.50)	
Age group (years)	18-25	85.00 (76.25,91.25)	0.245	79.38 (71.25,87.50)	0.229
	26-35	85.00 (76.25,91.25)		78.75 (70.00,86.25)	
	36-45	83.75 (76.25,91.25)		81.25 (70.00,87.50)	
	46-55	83.75 (75.00,90.00)		77.50 (67.50,86.25)	
	55-64	81.25 (73.75,91.25)		80 (68.75,88.75)	
Education	Lower than primary school	78.75 (68.75,88.75)	**<0.001**	70.00 (63.75,80.00)	**0.001**
	Primary school	81.25 (73.75,91.25)		77.50 (67.50,87.50)	
	Secondary school	85.00 (77.50,91.25)		78.75 (68.75,87.50)	
	College or higher	87.50 (81.25,93.75)		81.25 (72.50,87.50)	
Individual income	Q1(poorest)	82.50 (75.00, 90.00)	0.021	77.50 (63.75, 87.50)	**<0.001**
	Q2	83.75 (75.00, 91.25)		77.50 (68.75, 86.25)	
	Q3	81.25 (75.00, 91.25)		78.75 (68.75, 86.25)	
	Q4	85.00 (77.50, 92.50)		80.00 (72.50, 87.50)	
	Q5(richest)	85.00 (78.75, 91.25)		82.50 (75.00, 88.75)	
	NR[c]	71.25 (65.00, 96.25)		77.50 (68.75, 87.50)	
Employment status	Unemployed	82.50 (75.00, 91.25)	<0.001	78.75 (67.50, 88.75)	0.0548
	Employed, unskilled work	82.50 (73.75, 90.00)		77.50 (67.50, 86.25)	
	Employed, skilled work	86.25 (78.75, 93.75)		80.00 (70.00, 87.50)	

Variables		Lao PDR		Thailand	
		PWI(IQR)[a]	p-value[b]	PWI(IQR)[a]	p-value[b]
	Studying	85.00 (80.00, 90.00)		82.50 (71.88, 88.75)	
	Others (e.g. retired)	83.75 (76.25, 90.00)		85.00 (74.38, 88.75)	
Marital status	Single	82.50 (76.25, 90.00)	**0.003**	77.50 (68.75, 86.25)	**0.002**
	Married	85.00 (76.25, 91.25)		80.00 (70.00, 87.50)	
	Divorce/separated	80.63 (72.50, 87.50)		76.25 (63.13, 85.00)	
Living areas	Urban	82.50 (75.00, 90.00)	**0.001**	78.75 (68.75, 87.50)	0.632
	Rural	85.00 (76.25, 92.50)		78.75 (70.00, 87.50)	
Regions	North	87.50 (80.00, 95.00)	**<0.001**	77.50 (67.50, 86.25)	**<0.001**
	Central[d]	85.00 (77.50, 91.25)		76.25 (66.25, 85.00)	
	South	80.00 (72.50, 87.50)		81.25 (73.75, 87.50)	
	Northeast			81.25 (70.00, 88.75)	
	Bangkok			78.75 (66.25, 87.50)	
Respondents' drinking status	Non-drinkers	85.00 (75.00, 91.25)	**<0.001**	78.75 (68.75, 87.50)	0.587
	<5drinks	86.25 (77.50, 93.75)		78.75 (70.00, 87.50)	
	5+drinks less than weekly	81.25 (75.00, 88.75)		77.50 (68.75, 86.25)	
	5+ drinks at least weekly	82.50 (72.50, 90.00)		78.75 (68.75, 85.00)	
Heavy drinkers inside households	0	85.00 (76.25, 91.25)	**0.021**	78.75 (70.00, 87.50)	**0.048**
	1	81.88 (75.63, 91.25)		76.25 (66.25, 86.25)	
	+2	80.00 (73.75, 87.50)		80.00 (64.38, 85.00)	
Heavy drinkers outside households	0	85.00 (77.50, 92.50)	**<0.001**	80.00 (68.75, 87.50)	0.506
	1	81.25 (72.50, 88.75)		78.75 (70.00, 87.50)	
	+2	81.25 (75.00, 87.50)		77.50 (70.00, 86.25)	

[a]IQR=Interqautile Range of Personal Wellbeing Index,[b]Levels of statistical significance from Mann-Whitney U test or Kruskal-Wallis Test

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