

## Consumption of alcohol-free mock beverages, attitude toward alcohol, and alcohol consumption among Muslim youth in the deep south of Thailand: A mixed-methods study

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### Abstract

**Introduction:** Alcohol-free mock beverages are consumed by Muslims in the deep south region of Thailand, but the extent to which such consumption was associated with attitude toward alcohol and subsequent alcohol consumption is unknown. The objectives of our study were: (1) to describe the extent to which the consumption of alcohol-free mock beverages is associated with alcohol consumption among Muslim youths in the deep south of Thailand; and (2) to describe the extent to which attitude towards alcohol mediates the stated association.

**Methods:** We conducted a mixed-methods cross-sectional study. We used convenience sampling to source self-identified Muslims aged 18 to 40 years from Pattani Province, Thailand. We invited them to participate in a face-to-face survey interview and/or a qualitative study, with either a focus group discussion or in-depth interviews. Quantitative survey data was analyzed using descriptive statistics. We then performed mediation analysis using the mediation package in R. Qualitative data was analyzed using thematic analysis.

**Results:** A total of 407 persons participated in our study. Approximately 33% of the participants reported lifetime consumption of alcohol-free mock beverages and 6% reported a history of alcohol consumption. Current mock beverage consumers were significantly more likely to be current drinkers of alcohol than those who never consumed mock beverages (7.0% vs. 0.4%). Mediation analysis, however, showed that the association was not significantly mediated by attitude toward alcohol.

**Discussion and conclusion:** We found a strong association between alcohol-free mock beverage consumption and alcohol consumption. The findings have implications for stakeholders in public health, alcohol control, and religious leadership. However, limitations regarding the selection of participants and social desirability bias should be considered as caveats in the interpretation of the study findings.

### Introduction

The Quran prohibits the consumption of alcohol, a tenet adhered to by the majority of Muslim people. In Muslim-majority nations, the prohibition of alcohol is enforced through a combination of deeply-ingrained cultural norms and stringent legal frameworks (Shirazi, 2023). The legal frameworks may include comprehensive bans on alcohol production, distribution, and consumption. These measures correlate with markedly lower levels of alcohol intake in Muslim-majority nations compared to global averages, with some jurisdictions registering negligible consumption rates

(International Wine and Spirits Record [IWSR], 2023; World Health Organization, 2018).

However, despite these stringent regulations, multinational alcohol corporations persist in marketing their products within these territories, employing surrogate marketing tactics to circumvent the laws. These strategies involve the promotion of non-alcoholic variants of their beverages (hereinafter referred as “alcohol-free mock beverages” or simply “mock beverages”), i.e., exploiting legal loopholes to bypass regulations pertaining to alcohol advertisement (Assanangkornchai et al., 2016; IWSR, 2023). These beverages include international brands that only

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include mock beverages (such as Barbican and Moussy), as well as products from brands traditionally associated with alcohol that are the zero percent alcohol version of the main product (such as Heineken Zero). Mock beverages are strategically marketed to closely resemble alcoholic beverages, employing similar packaging and branding techniques. Such a marketing practice is reminiscent of the process of transforming drinking practices during the colonialist era in Muslim-majority countries such as Albania, Kazakhstan, Uzbekistan, and Azerbaijan (Bourmaud & Znaïen, 2022; Burazeri & Kark, 2010). An analysis of social media posts concerning sporting sponsorship of no-alcohol or low-alcohol beverages (*NoLo products*) in Australia showed that NoLo brands advertised their products as healthy recovery drinks ("sports beers") and used influencer marketing and competitions to appeal to young people (Miller & Wright, 2024). Surveys of adults in Great Britain showed that NoLo drinks consumption was more common among alcohol drinkers and those of higher socioeconomic status (Perman-Howe et al., 2024). Data from a global survey showed that the consumption of NoLo products was significantly associated with heavy drinking (Piatkowski et al., 2024). The pathway or mechanism through which consumption of mock beverages may induce alcohol consumption in Muslim-majority settings is unclear. As alcohol consumption is taboo in Islam, Muslim community members are known to express concern that even the mentioning of alcohol in general discourse could lead to changes in attitude toward drinking and the unintended consequence of promoting alcohol consumption (Alageel & Alomair, 2024). Thus, we hypothesize that the consumption of mock beverages in the Muslim community influences changes in alcohol-related attitudes, which in turn drives alcohol consumption.

Thailand's Pattani Province has a population of approximately 700,000 individuals, of whom approximately 80% adhere to the Islamic faith, and the remaining 20% identify as Buddhists. The province is in the deep south region of Thailand, and has a very specific context (multiethnic, multilingual, affected by decades of ethno-nationalist separatist insurgency) that differs from the rest of southern Thailand. Pattani Province historically had one of the lowest rates of alcohol consumption in the country (May, 2022). In recent years, there has been a notable increase in the availability and marketing of alcohol-free mock beverages (IWSR, 2023; Okaru and Lachenmeier, 2022). Nonetheless, no study has measured alcohol-free mock beverage consumption among young Muslims in Pattani, its association with alcohol consumption, or the pathway of such an association. The findings of this study should be of interest to stakeholders in alcohol control and social and economic developments in Muslim-majority countries and territories. As the association between the consumption of mock beverages and alcohol involves changes in attitude, which are complex human thought processes, we decided to use a mixed methods study. We aimed for the quantitative component to provide data on population-level association between the consumptions of mock beverages and alcohol, and the qualitative component to provide context and in-depth detail that further shapes the understanding regarding the theory of change.

The objectives of our study were: (1) to describe the extent to which the consumption of alcohol-free mock beverages is associated with the consumption of actual alcohol among Muslim youths in Pattani Province; and (2) to describe the extent to which attitude towards alcohol mediates the stated association.

## Methods

### Study Design and Setting

This research is a mixed methods study that included: (1) a quantitative face-to-face survey; and (2) a qualitative study with either focus group discussions or in-depth interviews. We collected data from tea shops and other common gathering places of youths in Pattani City Municipality areas, Pattani Province, southern Thailand.

### Study Participants and Sample Size Calculation

Our study participants included Muslim youths who met the following inclusion criteria: (a) age between 18 and 40 years; (b) able to communicate in Malay, Thai or English; (c) identified as Muslims. We excluded individuals whose physical or mental condition did not enable convenient participation in the survey interview, focus group discussion, or in-depth interview.

For sample size calculation, the investigators assumed that 30 percent of the participants had consumed an alcohol-free mock beverage in their lifetime based on *a priori* conversations with local youths ( $p = 0.30$ ), with an arbitrary 5% margin of error ( $\delta = 0.05$ ). Using the *Epicalc* package in R, we obtained a sample size of 323 participants. We also assumed that 80% of the potential participants would agree to participate, thus we adjusted the final sample size to 404 participants ( $n = 404$  Muslim youths).

### Study Variables

#### *Exposure: Consumption of Alcohol-Free Mock Beverages*

We modified the questions used in the National Survey of Alcohol Consumption Behavior in the Thai Adult Population (Wichaidit, Sittisombut, et al., 2021; Wichaidit et al., 2022) to measure the consumption of alcohol-free mock beverages by self-report. As alcohol-free mock beverages included those with the same brand as alcoholic beverages and those under specifically non-alcoholic brands, we decided to ask about their consumption separately. To reduce the probability of confusion, we asked pilot study participants about their understanding of the measurement questions and modified the questions according to the comments and feedback that we received. We decided to use the phrase "0% beer or 0% wine" to refer to the mock beverages and included images to suit the local context. In the final version of the study instrument, the measurement questions were: "In your lifetime, have you ever consumed 0% beer or 0% wine with the "same" brand name as alcoholic beverages (such as those that appeared in the picture)?" and "In your lifetime, have you ever consumed 0% beer or 0% wine with the "different" brand name as alcoholic beverages (such as those that appeared in the picture)?" Each of the measurement questions was followed by questions on the most recent occasion and frequency of consumption.

**Outcome: Alcohol consumption**

We used questions derived from a National Survey of alcohol consumption behavior among the general population of adults in Thailand (Wichaidit, Sittisombut, et al., 2021; Wichaidit et al., 2022) to measure alcohol consumption among our study participants. To mitigate potential reactions and suspicion from the research participants, our data collectors emphasized that no personally identifiable information would be collected and that participants were able to decline to answer any questions deemed culturally sensitive or taboo.

**Mediator: Attitude towards Alcohol Consumption**

We measured attitude towards alcohol consumption by adapting questions used by the Centre for Alcohol Studies (CAS) Thailand in surveys of public opinions regarding the liberalization of alcohol in Thailand. We also designed new questions based on local religious and cultural contexts, as well as recent events in a culturally similar region of Banda Aceh Province, Indonesia (Amnesty International, 2016). The attitude items are listed in Table 1.

**Other Characteristics of the Study Participants**

**Religiousness (Religiosity).** We adapted the Muslim Religiosity Scale (Saffari et al., 2016) and the Centrality of Religiosity Scale, 5-question version (Huber & Huber, 2012) to assess the religious inclination of the research participants. The questions were adjusted to align with the contextual nuances of the study area. We assigned one point for participants who met the criteria for each question and used the sum of the points as the religiosity score. Higher scores indicated higher levels of religiosity and spirituality.

**Demographic and Socioeconomic Characteristics.** We adapted the questions used in nationally-representative surveys of the general population of adults in Thailand (Wichaidit, Sittisombut, et al., 2021; Wichaidit et al., 2022) to measure the demographic and socioeconomic characteristics of the study participants (listed in Table 1).

**Study Instruments**

The study instruments included: a structured questionnaire for face-to-face survey interviews for the quantitative component and an interview guideline for focus group discussion or in-depth interview for the qualitative element. We designed the quantitative survey questions by adapting instruments used in previous studies (as mentioned above). The qualitative interview guidelines were developed based on internal consultation among the investigators. We used the field training session of the data collectors' training program as an opportunity to pilot-test the study instrument, which was finalized based on the feedback received.

**Data Collection**

Local university graduates who could speak the local dialect of Malay were recruited as data collectors and were provided with two days of training. The training program included research ethics, study protocols, research project specifics, utilization of research tools, data collection procedures, and field practice sessions.

After the training, we asked our data collectors to visit places where Muslim youths gathered (mostly tea shops in the Pattani City Municipality Area) and recruit potential participants using convenience sampling. We allowed the data collectors to select tea shops and other locations at their own discretion. Data collectors would introduce themselves to each potential participant, assess eligibility, provide information about the study (including the ability of the participant to refuse to answer any questions and stop data collection at any time), provide a copy of the participant information sheet, answer the potential participant's questions, ask for verbal informed consent for the quantitative and qualitative data collections separately, and ask for verbal consent to make voice recordings during qualitative data collection. Data collectors then asked the participants for their preferred location to provide information.

Data collectors conducted face-to-face structured interviews for the quantitative component using the *KoboToolbox* platform or the *KoboCollect* application. For the qualitative element, data collectors conducted either focus group discussions or in-depth interviews, depending on specific circumstances. For example, if the participants came to the study site in groups, the data collectors would opt for a focus group discussion instead of an in-depth interview. We allowed data collectors to probe for additional information at their discretion. At the end of the interview and/or discussion session, the data collectors would offer to buy coffee or other snacks for the participants at a value of no more than 100 Thai Baht (THB) per person to express gratitude for the participants' time.

**Data Management**

After each quantitative survey interview, data collectors uploaded the data to a password-protected KoboToolbox server at their earliest convenience. Only the investigators were allowed to access the survey data. We did not store any personally identifiable information in the study dataset.

After qualitative data collection, investigators hired contractors to transcribe the qualitative voice recordings (if in Thai) or (if in the local dialect of Malay) to transcribe and translate the recording into the Thai language. In cases where the data collectors took handwritten notes in lieu of voice recording in Thai, the investigators typed the notes. The practice of simultaneous transcription and translation of voice recordings in the local dialect of Malay into Thai is the standard operating procedure in the local area as no system to transliterate the Malay dialect exists (Hasamoh et al., 2025; Samoh, 2018; Samoh & Premrirat, 2021).

**Content Analysis**

For the qualitative data, the two investigators (MT and WW) performed content analysis by adapting procedures used in a previous study on alcohol consumption (Hendriks 2018).

**Coding Procedure**

The two investigators (MT and WW) served as the coders for the study. The investigators used MS Excel (Microsoft Corp) to store the transcribed texts, stratified by the session ID number. Each investigator then independently identified posts deemed to be relevant to the influence of alcohol-free

mock beverage consumption on alcohol-related attitudes and drinking behaviors, and compared their findings. In case of discrepancies between the two investigators, the investigators would discuss each instance and then come to a consensus. The investigators then retained texts deemed to be relevant based on consensus.

***Coding Variable: Influence of Alcohol-Free Mock Beverage Consumption on Alcohol-Related Attitudes and Behaviors***

One of the two main investigators (WW) then coded the retained texts regarding the mechanism through which mock beverage consumption influenced alcohol-related attitudes and behaviors. The investigators then compared the findings. In case of discrepancies between the two investigators, the investigators would deliberate and then come to a consensus. The investigators would then record the final consensus on the spreadsheet file, perform data cleaning, and prepare the file for descriptive statistical analyses.

**Data Analysis**

Investigators conducted quantitative data analysis using descriptive statistics in conjunction with tests, such as one-way ANOVA for attitude scores and religiousness scores, and the Chi-square test of independence or Fisher's exact test for categorizing beer-wine consumption behavior types and alcoholic beverages. We analyzed quantitative survey data using descriptive statistics and univariable and multivariable logistic regression analyses. We identified demographic characteristics, socioeconomic characteristics, and religiosity as potential confounders according to the findings from a previous study among the general population of Thailand (Wichaidit et al., 2022) and among Muslims in Norway (Ishaq et al., 2021) and adjusted for them accordingly. For mediation analysis, we followed the steps outlined in an online tutorial (Renard, 2019) and adapted them for our study using the *Mediation* package in R. We used the alcohol-related attitude score as a numeric measurement of attitude toward alcohol consumption. We considered current drinking (within the past 12 months) to be at a higher level than former drinking (lifetime, but not in the past 12 months). Thus, we arbitrarily assigned a numeric value of 1 for never drinking, 2 for former drinking, and 3 for current drinking. For the consumption of alcohol-free mock beverages, we followed the same numerical value assignment. We considered participants who did not answer either of the two questions on the consumption of alcohol-free mock beverages as those who provided incomplete information and excluded them from regression analyses and mediation assessment. We also excluded all participants who did not answer questions about alcohol-related attitudes.

For qualitative data from content analysis, we presented the findings using descriptive statistics (frequencies and percentages) of the findings. The investigators also selected quotations deemed to be illustrative of the identified mechanisms. The corresponding author (WW) then

translated the findings and the quotes from Thai to English for presentation in this manuscript.

**Ethical Considerations**

We received research ethical approval from the Research Ethics Committee in Science, Technology, and Health Sciences at Prince of Songkla University, Pattani Campus (No. PSU.PN.1-008/66). We requested a waiver from written informed consent from the local institutional review board due to the ongoing armed insurgency situation in Thailand's Deep South, for which the signing of any legal document is deemed with suspicion and had the potential to introduce bias to the study.

**Results**

A total of 407 persons agreed to participate in our study. The majority of the participants were male with the mean age of 23 years (Table 1). The majority of the participants were students, with a personal income of less than 10,000 THB per month, single, with high school education or less. More than half of all participants reported adherence to all religiosity items except for the one on making the non-obligatory *Sunnah* prayers (mean religiosity score =  $5.4 \pm 0.9$  points). Approximately 33% of the participants reported lifetime consumption of non-alcoholic mock beverages and 6% of the participants reported lifetime consumption of alcohol. Cross-tabulation of non-alcoholic mock beverage consumption and drinking behaviors (Table 2) showed that participants who were current consumers of non-alcoholic mock beverages were significantly more likely to be former drinkers of alcohol than those who had never consumed non-alcoholic mock beverages (12.7% vs. 1.6%), and also significantly more likely to be current drinkers of alcohol (7.0% vs. 0.4%). Mediation analysis (Figure 1), however, showed that the association was not significantly mediated by attitude toward alcohol.

Content analysis of the qualitative data showed that peer influence was mentioned as the most common motivation for consuming non-alcoholic mock beverages (Table 3). The most commonly mentioned path of association between consuming non-alcoholic mock beverages and alcoholic beverages was through increased leniency regarding alcohol consumption through normalization, and that non-alcoholic mock beverages were commonly perceived as an initiation or gateway drink. The presence of the *Halal* symbol on the mock-alcohol beverage containers was most commonly mentioned as the divide between what was *halal* (permitted) vs. *haram* (forbidden). Viewpoints regarding control of access to non-alcoholic mock beverages varied, but seemed to favor religious sanctions in Muslim communities and health education in religiously diverse settings. Opinions regarding the classification of non-alcoholic mock beverages veered toward classifying the beverage as either *haram* (forbidden) or *shubha* (caution is advised).

Table 1

**Characteristics of the Study Participants (n = 407)**

Characteristic	Number (%) or Mean $\pm$ SD
Age (years)	23.4 $\pm$ 5.8
<b>Sex<sup>a</sup> (n = 405)</b>	
Male	232 (57.3%)
Female	168 (41.5%)
Other/Not sure	4 (1.0%)
Did not answer	1 (0.2%)
<b>Current occupation with main income</b>	
Group 1: Salaried workers (Civil servants/government officers, Private company employees)	65 (16.0%)
Group 2: Traders or business owners (Retail trading/retail services, Private business/entrepreneur, Freelance occupations such as lawyers, architects)	50 (12.3%)
Group 3: Students	215 (52.8%)
Group 4: Others or no income (Labor/general contractors, Retired/housewife, Unemployed, Other)	73 (17.9%)
Did not answer	4 (1.0%)
<b>Personal income per month (1 \$ approximately 37 THB, in 2024)</b>	
Less than 5,000 THB	159 (39.1%)
5,000–9,999 THB	92 (22.6%)
10,000–14,999 THB	45 (11.1%)
15,000–19,999 THB	28 (6.9%)
20,000–24,999 THB	21 (5.2%)
25,000 THB or more	24 (5.9%)
Did not answer	38 (9.3%)
<b>Marital status<sup>a</sup> (n = 406)</b>	
Single	312 (76.8%)
Married	83 (20.4%)
Cohabitation (unmarried)	6 (1.5%)
Did not answer	5 (1.2%)
<b>Highest level of education completed</b>	
Junior high school or less	48 (11.8%)
High school or equivalent	177 (43.5%)
Post-secondary (less than Bachelor's degree)	25 (6.1%)
Bachelor's degree or higher	155 (38.1%)
Refused to answer	2 (0.5%)
<b>Religiosity</b>	
Frequency in thinking about religion per week (Answer: <i>Frequently (5-6 days per week)</i> or <i>Very frequently (every day or more than once per day)</i> )	281 (75.3%)
Frequency of praying ( <i>Fard/Wajib</i> ) (Answered: <i>5 times per day</i> )	311 (82.1%)
Frequency of making <i>Sunnah</i> prayers (Answered: <i>5 times per day</i> )	20 (5.9%)
Frequency of experiencing situations in which the participant had the feeling that God intervenes in the participants' life (e.g., a small miracle to avoid or overcome hardship; Answered: <i>Often</i> or <i>Always</i> )	263 (69.4%)
Agreement with the statement: "You can feel the presence of Allah" (Answered: <i>Agree</i> or <i>Strongly Agree</i> )	395 (99.5%)
Agreement with the statement: "You apply religious beliefs in your whole approach to life" (Answered: <i>Agree</i> or <i>Strongly Agree</i> )	358 (98.9%)
Agreement with the statement: "You apply religious beliefs to all dealings in life" (Answered: <i>Strongly Agree</i> or <i>Somewhat Agree</i> )	342 (98.0%)
Religiosity score (mean $\pm$ SD)	5.4 $\pm$ 0.9

Table 1 (continued)

Characteristic	Number (%) or Mean $\pm$ SD
Agreement with the statement: "You apply religious beliefs to all dealings in life" (Answered: <i>Strongly Agree</i> or <i>Somewhat Agree</i> )	342 (98.0%)
Religiosity score (mean $\pm$ SD)	5.4 $\pm$ 0.9
<b>Attitude toward alcohol consumption<sup>a</sup></b>	
"The government should ban the sale of liquor and beer near mosques, similar to the existing law that prohibits sales near schools." (Answered: <i>Agree</i> or <i>Strongly Agree</i> ; n = 392)	381 (97.2%)
"The government should enact a law that prohibits the sale of alcohol to individuals who identify as Muslim on their ID card, similar to existing law that prohibits sale to minors under the age of 20." (Answered: <i>Agree</i> or <i>Strongly Agree</i> ; n = 373)	352 (94.4%)
"There should be no restrictions on the sale of alcohol based on religion; individuals over the age of 20 should be able to purchase alcohol regardless of their religious affiliation." (Answered: <i>Disagree</i> or <i>Strongly Disagree</i> ; n = 339)	244 (72.0%)
"In the southern border provinces (Muslim majority area), the government should allow the use of Sharia law to impose punishment on Muslims who consume alcohol." (Answered: <i>Agree</i> or <i>Strongly Agree</i> ; n = 332)	238 (71.7%)
"In the southern border provinces, the government should allow the use of Sharia law to impose punishment for those who drink alcohol, regardless of their religion." (Answered: <i>Agree</i> or <i>Strongly Agree</i> ; n = 304)	88 (28.9%)
"The government should enact a law strictly prohibiting the sale of alcohol in the southern border provinces." (Answered: <i>Agree</i> or <i>Strongly Agree</i> ; n = 340)	197 (57.9%)
Alcohol-related attitude score (mean $\pm$ SD)	4.2 $\pm$ 1.3
<b>Consumption of non-alcoholic mock beverages</b>	
Never consumed mock beverages	254 (62.4%)
Former consumers (not in the past 12 months)	60 (14.7%)
Current consumers (within the past 12 months)	74 (18.2%)
Incomplete information	19 (4.7%)
<b>Consumption of alcohol</b>	
Never drinkers	362 (88.9%)
Former drinkers (not in the past 12 months)	17 (4.2%)
Current drinkers (within the past 12 months)	7 (1.7%)
Incomplete information	21 (5.2%)

**Notes:**

<sup>a</sup> There were a small number of missing cases for sex and marital status, and a larger number of missing cases for responses to the attitude toward alcohol consumption statements, where participants declined to provide an answer and were not a part of the denominator for each respective statement.

Table 2

**History of Non-Alcoholic Beverage Consumption with a History of Alcohol Drinking Behavior**

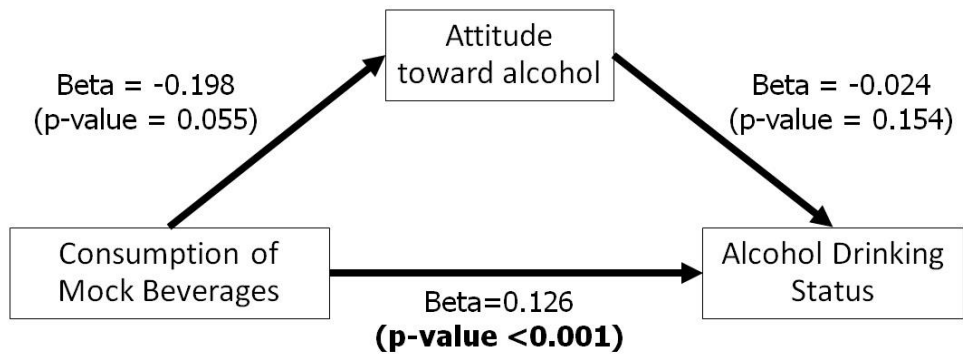
Non-Alcoholic Mock Beverage Consumption	Never drinkers	Former drinkers (not in the past 12 months)	Current drinkers (in the past 12 months)	Unadjusted OR (95% CI) for Former vs. Never drinking	Unadjusted OR (95% CI) for Current vs. Never drinking	Adjusted OR (95% CI) for Former vs. Never drinking*	Adjusted OR (95% CI) for Current vs. Never drinking*
Never consumers (n = 254)	242 (98.0%)	4 (1.6%)	1 (0.4%)	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Former consumers (not in past 12 months; n = 60)	56 (96.6%)	2 (3.4%)	0 (0.0%)	2.16 (0.39, 12.09)	N/A**	1.21 (0.02, 70.89)	N/A**
Current consumers (n = 74)	57 (80.3%)	9 (12.7%)	5 (7.0%)	<b>9.55 (2.84, 32.12)</b>	<b>21.23 (2.43, 185.24)</b>	<b>87.25 (6.07, 1253.62)</b>	N/A**

\*Adjusted for age, sex, occupation, income, marital status, education level, and religiosity score

\*\*Calculation could not be made.

**Figure 1**

*Mediation Analysis of the Association between Alcohol-Free Mock Beverage Consumption and Consumption of Actual Alcohol with Attitude toward Alcohol as the Mediator*



**Table 3**

*Content Analysis of the Influence of Alcohol-Free Mock Beverage Consumption on Alcohol-Related Attitudes and Behaviors*

Topic	Domain	Frequency in transcripts	Example quotes
Motivation for consuming alcohol-free mock beverages	Following social trends	2	In my opinion, it's best to avoid consuming these beverages if possible. Around here, people drink things that are trendy, that are cool. If you could, please do more research about this. Choosing these beverages portray Islam in a bad light. (Participant 3083)
	Modernization	3	...They might see things from series, shows, or from TV, so they want to try it. Especially the 0% beer; there is no alcohol so they think they are allowed to drink it. (Participant 3083)
	Peer Influence	8	Muslims don't drink alcohol. That's a principle of Islam. Those who practice Islam should not touch intoxicating things. Drinking 0% beer might happen because people follow their friends. Their Thai Buddhist friends might influence them. (Participant 2018)
	Religiosity (experimenting without breaking religious law)	4	[Muslim adolescents] may want to try new things, starting from 0% alcohol drinks and escalating to alcoholic beverages. (Participant 2018)
Association between consuming mock beverages and alcohol-related attitude	Appearance of physical product → increase attitude of positive perception	1	For me, I think that [seeing advertisements frequently] can create familiarity because we are exposed [to the products] a lot. (Participant 1018)

Table 3 (continued)

Topic	Domain	Frequency in transcripts	Example quotes
Association between consuming mock beverages and alcohol-related attitude (continued)	Increased leniency through normalization	5	<p>Personally, I think that [consumption of 0% beer or wine], it is absolutely inappropriate to make drinks that resemble beer or wine. It's inducing children to try things that are similar to alcohol an beer. If you want to make 0% alcoholic beverages with Halal sign, then the bottles should be designed differently. This may create confusion among children. Is it risky? Very risky. Kids aged 14-15 years won't take the time to read these things. If someone say they are allowed to drink it, they will drink. I faced this personally. These days, social media are open, so when kids drink these things, set up the bottles on the table and post the pictures on social media, people would react like 'Oh, are we actually Muslims?' People may see the pictures and think that Muslims can drink alcohol. People who don't know our religion may assume that we are allowed to drink. (Focus group participants 1054 to 1057)</p> <p>I think it depends on each person's sense of control. Some people just want to experiment while others go overboard. Personally, it depends on each person's character. Maybe no everyone, but my personal opinion is that it would be great to never try them, things that involve alcohol (Participant 2004)</p>
Association between consuming mock beverages and alcohol consumption	Zero-alcohol drinks invoke a sense of curiosity about alcohol	2	[Trying new things] enable us to know what things are like, such as what 0% beer is like. (Participant 2018)
	Zero-alcohol drinks as imitation / gateway drink	9	It is possible [that having 0% alcohol beverages at most cafes will increase the risk of alcohol consumption among adolescents]. People here like beverages and going to cafes. So I think it's possible. This is also the age where people open themselves to the world. (Participant 1018)
The divide between haram and halal	<i>Halal</i> symbol	5	<p>In my view, people who are really religious may not drink [despite the <i>Halal</i> symbol]. People who want to try and don't mind the religion too much might try. The religious principles clearly state that <i>haram</i>-looking things cannot be consumed. (Participant 1018)</p> <p>[The divide between what is <i>Halal</i> and <i>haram</i>] should be the <i>Halal</i> symbol, not necessarily from that of our country ... Yes [the emphasis is on the <i>Halal</i> symbol] (Participant 3084)</p>
	Alcohol content	3	<p>Personally, I feel that [0% alcohol beverages] are not to be consumed. The word 'alcohol' is still there in the '0% alcohol' phrase. So there must be some hidden things. The bottle looks like the bottles for whiskey and beer, so I do not have the confidence to drink it at this time.</p> <p>I felt 'Wow, there's a 0% version for us to try'. So I tried it and felt good. There was something for us to try without being drunk.</p>

Table 3 (continued)

Topic	Domain	Frequency in transcripts	Example quotes
	Alcohol content (continued)		I never had it, but I personally disagree. These things are not trustworthy. It's as though the alcohol is still there. I feel that the beverages are not 100% <i>Halal</i> . (Focus group discussion participants 1054 to 1057)
Control of access to 0% alcohol beer or wine	Self-control	2	In the big picture [the control of 0% alcohol beverages] may be difficult. It depends on the parents. I think it depends on the crowd we hang out with. It all depends on ourselves. (Participant 2018)
	Health education as a mean for self-imposed control	3	For me, I would talk to [young people aged 14-15 years] nicely. I would tell them what is good and bad, and how we should deal with friends. If we want to try and it's not our thing, then we should stop. If we try and feel that it fits, then we think again on whether we should do bad things. (Participant 2018)
	Social norms and sanction	3	If a younger friend [is drinking 0% alcohol beverages], if I was close to that person, I might tell then 'Hey, the thing that you're drinking may have something in the production process that makes the drink not permissible'. But I would not make that call unless I really know it. (Participant 3084)
	Religious sanction	2	The 0% alcohol drinks are at affordable prices. So how do we control it? Among Muslims, we need a campaign against selling such drinks in Muslim communities. In diverse areas, we may not be able to use such control strategy, so we need to educate youths and campaign for them to be away from alcohol and drugs. (Participant 2016)
Classifying 0% alcohol beer or wine as <i>Shubha</i>	Affirmative response	5	I grew up in a religious school. The school told me what should be the things we avoid due to ambiguity, and that it is best to avoid them. (Participant 2004)  Even though it's 0% alcohol wine, it's still wine. The product and drinking method is similar. (Participant 2006)
	Negative response	2	In my opinion, these beverages should not be considered as <i>Subhat</i> . Some people are not aware of the production process. [In the future, 0% alcohol beverages] may [become] more accepted. Right now consumption is pretty common, and might be more so in the future.... People might look at <i>Halal</i> signs. If there is no <i>Halal</i> signs on Heineken, Muslims won't drink it. (Participant 3084)
	Should be <i>haram</i>	8	I agree with classifying these beverages as <i>subhat</i> . Personally, I would prefer to see them classified as <i>haram</i> so that people avoid them. Youths would avoid and never drink them again" (Participant 2016)  I think that it's in the center, as <i>subhat</i> . It's ambiguous. Personally, I think it's better to classify this as <i>haram</i> , so that people avoid them because they consider them as a kind of beer" (Participant 2018)

## Discussion

In this mixed-methods cross-sectional study, we found that the consumption of alcohol-free mock beverages was significantly associated with the consumption of actual alcohol among Muslim youths in Thailand's Pattani Province, although there was no evidence that the changes occurred through differences in attitude toward alcohol. Considering that alcohol-free mock beverages have been widely imported and sold in the southern border provinces for less than 10 years prior to the survey, the results of this study provide documentation of an ongoing social phenomenon and may have implications for stakeholders in alcohol control both in the region and in other predominantly Muslim settings.

We found a significant association between the consumption of alcohol-free mock beverages and alcohol consumption, but no evidence that attitude towards alcohol consumption mediated this association. The qualitative findings suggested that the participants were generally conservative regarding alcohol use. The findings were similar to those from a qualitative study conducted among Muslim participants in the Middle East, wherein the participants expressed concerns that raising awareness about alcohol-related harm could be viewed as accepting and encouraging alcohol use (Alageel & Alomair, 2024). The prevalence of lifetime drinking among current mock beverage consumers was nearly 20%, i.e., higher than the prevalence of lifetime drinking among women in the general population of Thailand (Wichaidit et al., 2019). The lack of mediation by attitude toward alcohol consumption suggested that other pathways in the association might have existed and should be considered in future studies.

One issue regarding data collection in our study was that we allowed our data collectors to have complete autonomy and discretion regarding the study location, as the subject matter of the study could be considered a sensitive issue by the local community. We hoped that the autonomy in choosing the study location would enable data collectors to build rapport with participants and collect information more conveniently. We acknowledge that the convenient selection of tea shops could have introduced selection bias to our study findings. However, without such flexibility, we might only have been able to recruit participants who were reluctant to provide truthful information. Another issue regarding data collection in our study was the use of face-to-face interviews instead of self-administered questionnaires, the latter of which might have allowed participants to respond privately regarding sensitive matters (Wichaidit, Assanangkornchai, et al., 2021; Wichaidit et al., 2023). The investigators chose face-to-face interviews as the first language of most participants was a local dialect of Malay, which does not have a standard written format (Samoh, 2018; Samoh & Premrirat, 2021). The most common data collection method for the region was to draft a questionnaire in Thai and then request bilingual enumerators to interpret the written questions in Thai into the local spoken dialect of Malay during the interview itself (Hasamoh et al., 2025). Due to the complex history and socioeconomic contexts of the local area (Samoh, 2018; Samoh & Premrirat, 2021; Uddin & Sarntisart, 2023), the

investigators reached a consensus during the study design phase that code-switching would be strongly preferred over the exclusive use of the Thai language.

A strength of this research is the adoption of tools that have been used and validated in previous research, and the willingness of most individuals approached by the research assistant to provide information. However, this research has some limitations. Firstly, data were collected from places where young people gathered. As a result, more than three-quarters of our participants were single, and more than half were students. The inclusion criterion regarding self-identification as Muslims might have led to the recruitment of participants who scored relatively high on the religiosity scale with a relatively low prevalence of alcohol consumption (Michalak & Trocki, 2006). Our study findings are not generalizable to the general population of the study area or the less religious youths from Muslim families. Secondly, this dataset may be subject to selection bias due to the convenience sampling method used to select participants. Thirdly, alcohol consumption behavior is a sensitive subject in the southern border provinces. Despite the reassurance of anonymity, it is possible that social desirability bias could have influenced our study participants, as was found in another study in a predominantly Muslim setting (Alhashimi et al., 2018), and led to responses that deviated from the truth. Lastly, our study was of the cross-sectional design, and the possibility of reverse causation (i.e., that drinking alcohol precedes the consumption of mock beverages; Caballeria et al., 2022) should not be precluded from the interpretation of the study findings.

## Conclusion

We found a relationship between consuming alcohol-free mock beverages and consumption of actual alcohol with a large margin of difference, although the extent to which the association occurred through changes in alcohol-related attitude was unclear. The study findings provided basic information for stakeholders in public health, alcohol control, and religious services, particularly those working in the study area and predominantly Muslim communities. Future studies should further explore other potential pathways of the association between the consumption of mock beverages and alcohol consumption.

## Policy Recommendations

In Muslim-majority states where non-alcoholic beverage products are widely sold and religious organizations participate in governance, the relationship between consuming these beverages and alcohol consumption behavior should be considered. Although there is no evidence suggesting that consuming non-alcoholic beverages acts as an inducement to drink alcohol through changes in attitude toward alcohol consumption, the relationship between the consumptions of non-alcoholic beverages and alcohol in this study was statistically significant, and current consumers of mock beverages who were Muslims had the same level of lifetime alcohol consumption as Thai women. Relevant religious authorities should consider the consumption of mock beverages as a

behavioral health issue. Religious authorities should also consider using the findings of this study as basic and preliminary information to support the background and rationale when exploring measures to address the issue.

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