Research article

Understanding Sugar-sweetened Beverages Consumption Behavior among Cambodian Nursing and Midwifery Students in Phnom Penh, Cambodia using Social Cognitive Theory

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ABSTRACT

Excessive sugar-sweetened beverages (SSBs) consumption contributes to obesity, type 2 diabetes, and other metabolic disorders. Despite knowledge and awareness of these risks, nursing and midwifery students often continue to consume SSBs, suggesting some knowledge–behavior gap. Understanding the factors driving SSBs consumption in this population is critical for developing effective nutrition interventions. The objective of this study is to examine the association between knowledge, self-efficacy and accessibility and the amount of SSBs intake among nursing and midwifery students in Phnom Penh, Cambodia. A cross-sectional survey was conducted among 420 nursing and midwifery students in Phnom Penh, Cambodia (mean age 20.8±2.4 years) using pencil-and-paper questionnaires to assess SSBs intake, knowledge, self-efficacy, and accessibility toward SSBs consumption. Multivariable linear regression with adjustment for covariates was used to examine the associations between these factors and SSBs intake. Results showed that the average daily intake of SSBs in this population was approximately 11 ounces/day, providing approximately 40 grams of sugar and 300 kilocalories. Students who reported higher self-efficacy consumed lower amounts amount of SSBs (6 oz of SSBs, and 21 grams of sugar from SSBs) than those who reported lower self-efficacy. Knowledge and accessibility did not appear to be significantly associated with SSBs consumption in this population. These findings highlight the fact that focusing on improving self-efficacy, rather than knowledge alone, could be a promising strategy for future nutrition interventions to decrease SSBs consumption in this population.

Key words: nursing and midwifery, self-efficacy, sugar-sweetened beverages, health behaviour

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INTRODUCTION

Non-communicable diseases (NCDs), particularly diabetes, are a major global public health concern. According to the International Diabetes Federation (IDF) in 2019, an estimated 463.0 million adults worldwide are living with diabetes. The number is estimated to increase to 578 and 700 million by 2030 and 2045, respectively[1]. Nearly 90% of patients with diabetes who did not receive adequate treatment resided in low- and middle-income countries, including African, South-east Asian and the Western Pacific countries[2]. Cambodia is among the Southeast Asian countries currently experiencing an increasing prevalence of diabetes. This increase poses a major threat to the country's development, through both direct burdens on patients and indirect economic losses[3].

To reduce the risk of developing NCDs, including diabetes, the World Health Organization (WHO) recommends lifestyle modification that includes tobacco use, harmful use of alcohol, an unhealthy diet and physical inactivity[4]. Among dietary factors contributing to the development of NCDs, excessive sugar-sweetened beverages (SSBs) consumption is a leading factor, attributing to around 184,000 deaths per year worldwide and five percent of SSBs related deaths occurring in low-income countries[5]. SSBs are defined as beverages with added sugars or sweeteners, including carbonated drinks, soft drinks, sodas, fruit juices, sweetened coffees and teas, energy drinks, sports drinks, and sweetened waters[6]. A study examining global trends from 1990 to 2016 indicated that SSBs have become more affordable and increasingly consumed, particularly in low-income countries[7]. In Cambodia, SSBs consumption has been driven by the rapid expansion of shops offering a wide variety of soft drinks, coffees, and other SSBs, often featuring appealing decorations and environments. A recent survey revealed that approximately 46% of teenagers consumed carbonated soft drinks at least once daily[8], and almost one-third of adults aged 18–59 consumed soft drinks more than 3 times per week[9].

Healthcare professionals, such as nurses and midwives, are expected to have basic knowledge about risk factors of NCDs, especially excessive SSBs intake. They are also an integral part of health promotion, as nurses may have a role in the prevention and treatment of NCDs through nutrition and health education[10,11]. They can also be a role model for healthful lifestyle behaviors[12–14]. However, nurses and midwives remain vulnerable to NCDs, partly due to lifestyle behaviors that may not be optimal for health[15]. Thus, the prevalence of NCDs and Obesity is still high among this population[16–18]. Interventions at the early point of a health professional career may help set them on a positive path, which may eventually result in long-lasting healthy habits[19].

To understand factors that influence health behaviors, many studies utilized health behavior theories as a theoretical framework[20]. Social Cognitive Theory (SCT) is among the most prevalent theories used in health research[21]. It examines how both individual and socio-environmental factors influence health-related behaviors. The three-way model used by SCT to explain human behavior involves constant interactions between the environment, individual characteristics, and behavior[22]. However, in Cambodia, studies examining health

behaviors, particularly SSBs consumption among nurses and midwives are limited, and evidence among students is even more scarce. Exploring factors that influence SSBs consumption among nursing and midwifery students may provide a foundation for designing tailored nutrition communication strategies to reduce SSBs consumption in this specific population who represents future healthcare professional workforce. Therefore, this study aims to explore the association between theoretical factors, including knowledge, self-efficacy, and accessibility, and SSBs intake among Cambodian nursing and midwifery students in Phnom Penh.

MATERIALS AND METHODS

Study Design

A cross-sectional study was conducted among Cambodian nursing and midwifery students enrolled at a medical University in Phnom Penh, Cambodia from August to November 2024. The study involves the use of a series of paper-based surveys in which participants self-completed the questionnaires in-person. This study was reviewed and granted exempt status by the Mahidol University Central Institutional Review Board (MU-CIRB; COE No. MU-CIRB 2024/074.2405) prior to data collection. Participants were informed about the objectives and processes of the study. They voluntarily provided written consent before participating in the study.

Study Population

The target population for this study is Cambodian nursing and midwifery students in Phnom Penh, Cambodia. Participants were eligible if they were: 1) Cambodian nationals, 2) aged 18 years or older, and 3) currently enrolled in a nursing or midwifery program. Participants were excluded if they were: 1) unwilling to complete the questionnaires, or 2) had mental or cognitive impairments that prevented them from completing the survey independently. The required sample size was calculated using Cochran's formula ($n_0 = Z^2 \times p(1-p) / e^2$). Based on an estimated prevalence of 44.7% for SSBs consumption among Cambodian adults in Phnom Penh[9] ($p = 0.447$), as reported in previous literature, a 95% confidence level ($Z = 1.96$), and a 5% margin of error ($e = 0.05$), the initial calculation yielded a minimum requirement of 380 participants. Taking into consideration anticipated non-response or incomplete responses of 10%, the final sample size was determined at 418 participants.

Data Collection Process

Participants were recruited through poster advertisements and scheduled outreach at a university in Phnom Penh. Interested participants provided informed consent to participate in the study. They were then given a printed copy of the questionnaire along with a pen to complete it on site. A paper-based questionnaire was a convenient tool in Cambodia due to limitations in technology[23,24]. The questionnaire consisted of three sections: demographic characteristics, SSBs intake, and health-related behaviors, including knowledge, self-efficacy, and accessibility toward SSBs consumption.

Data on the average daily amount of SSBs intake were collected using an adapted questionnaire from the Beverage Intake

Questionnaire (BEVQ-15), developed in 2020 by Virginia Polytechnic Institute and State University[25]. To develop the questionnaire, the Beverage Intake Questionnaire (BEVQ-15) was adapted based on an observation of available beverages across the campuses and nearby off-campus areas in three universities in Phnom Penh. Standard categories (water, milk, liquor, wine) were replaced with eight beverage types popular among Cambodian young adults, such as fruit frappes, energy drinks, and ready-to-drink coffees. In addition, formative interviews with ten nursing and midwifery students using a one-week dietary history questionnaire were conducted to obtain additional information regarding the types of beverages they commonly consumed, frequency, and amounts. This formative interview also supported the fact that no additional beverage categories should be needed. Following translation into Khmer, content validity was evaluated by five nursing and midwifery practitioners to ensure clarity of the items, comprehension of the questions, and consistency in interpretation among respondents. Their feedback focused primarily on refining portion size descriptions, which were incorporated into the final questionnaire. The final questionnaire consists of 14 beverage categories grouped into two domains: fresh drinks and commercial drinks. For each beverage category, seven frequency levels were used: never or less than once per week, once per week, two to three times per week, four to six times per week, once per day, twice per day, and more than three times per day. Six portion size levels were provided: less than 6 ounces (oz.) (¾ cup), 8 oz. (1 cup), 12 oz. (1½ cups), 16 oz. (2 cups), 20 oz. (2½ cups), and more than 20 oz. Reliability test was conducted on the questionnaire. The Cronbach's alpha coefficient for the scale was 0.78, indicating acceptable internal consistency.

Data on sugar and energy intake from SSBs were calculated based on nutritional information from the Asian Food Composition database[26], U.S. Department of Agriculture's (USDA) Food Data Central database[27] and product labels. The sugar content and calorie information on each beverage container were used to calculate the amount of sugar and calories per drink. For freshly prepared beverages (e.g., frappes, coffees, iced teas), sugar and calorie content were estimated using common standard shop recipes in Phnom Penh. To determine these baseline recipes, the researcher conducted direct observations of the preparation process across multiple local beverage shops and interviewed beverage vendors regarding their standard ingredient quantities, utilizing established rapport with select sellers to ensure accuracy. These observed ingredient measures were then cross-referenced with nutrition databases to estimate the final sugar and calorie values per drink. To determine daily SSBs, total sugar, and energy intake from SSBs, the total amount of each beverage category consumed in a week was divided by seven. Daily consumption frequency of each beverage category was then multiplied by the average sugar and energy content for a standard portion. The total amount of SSBs, sugar, and energy intake from SSBs for each participant were then calculated by adding the amount from each beverage category.

Regarding knowledge, self-efficacy, and accessibility regarding SSBs consumption. The

questionnaires utilized SCT as a theoretical framework. Questions regarding SSB-related knowledge and self-efficacy were adapted from the instrument developed by Sugar-Sweetened Beverage Questionnaires[28], retaining all original core items. However, the environmental accessibility section was modified to focus exclusively on three target areas: on-campus, off-campus, and at home[29]. Following translation into Khmer, content validity and comprehension were evaluated by an expert panel of five nursing and midwifery practitioners in Phnom Penh to ensure clarity, comprehension, and consistent interpretation of the items. No items were added or deleted during this validation process; final refinements were restricted to clarifying portion size descriptions to ensure consistent interpretation among respondents. Overall, the knowledge section consisted of nine questions, with incorrect or “do not know” responses scored as 0 and correct responses scored as 1. Self-efficacy section included twelve questions. Responses for self-efficacy ranged from “Not sure at all” to “Extremely sure,” “Strongly disagree” to “Strongly agree,” and “Do not want to at all” to “Very much want to,” and were scored using a Likert scale. Lower scores indicated lower self-efficacy toward limiting SSBs consumption. The accessibility section consisted of three questions, with responses ranging from “Strongly disagree” to “Strongly agree.” Higher scores indicated greater accessibility to SSBs consumption. The Cronbach's alpha coefficient for the scale was 0.70, indicating acceptable internal consistency for the questionnaire.

Statistical Analysis

Descriptive statistics were used to summarize the demographic characteristics of participants. Categorical variables were reported as frequencies and percentages. Continuous variables were presented as means and standard deviations for normally distributed data, and as medians and interquartile ranges for non-normally distributed data. The distribution of continuous variables was assessed before selecting statistical tests. To facilitate descriptive group comparisons, knowledge, self-efficacy, and accessibility scores were dichotomized into lower and higher levels using the median values of the observed score distributions, with cut-off points of 5, 3, and 3.67, respectively. Median-based cut-offs were used because no universally accepted or validated thresholds were available for these adapted questionnaires in Cambodian nursing and midwifery students. Because SSBs intake was non-normally distributed, the Mann–Whitney U-test was used to compare SSBs intake between lower and higher score groups.

To examine the associations between knowledge, self-efficacy, accessibility, and SSBs intake, multivariable linear regression was performed. Model 1 was an unadjusted model. Model 2 was adjusted for potential confounders selected based on theoretical relevance and previous literature, including sociodemographic factors (age, gender, educational level, monthly allowance, and living status), lifestyle behaviors (alcohol consumption, and physical activity), and body mass index (BMI). These variables were included because they may influence both SSBs-related psychosocial factors and SSBs intake. Prior to the analysis, assumptions of linear regression were assessed, including linearity,

normality of residuals, homoscedasticity, and multicollinearity using diagnostic plots and variance inflation factors. No serious violations of assumptions were observed. Statistical significance was defined as $p < 0.05$.

RESULTS

A total of 420 nursing and midwifery students participated in this study, with the majority being female (71%) and having an average age of 20.8±2.4 years. Most participants were enrolled in nursing programs (77.6%) and were in their first year of study (52.4%). The majority were from rural areas (91%) and had a monthly allowance of less than 100 USD (47.9%). Physical activity levels were generally low, with 42.9% reporting insufficient activity, while smoking was rare (99.8% non-smokers) and 72.9% of participants did not consume alcohol. In terms BMI, the mean BMI was 20.0±2.8 kg/m², with the largest proportion of participants (52.4%) categorized as having a normal weight. However, 33.3% were classified as underweight, and a smaller proportion (14.3%) were categorized as overweight and obese (**Table 1**).

Table 1. Demographic Characteristics of Study Participants (n=420)

Characteristics	Participants (n=420)
Age, years, mean (SD)	20.8 (2.4)
Gender, n (%)	
Male	107 (25.5)
Female	299 (71.2)
Other	14 (3.3)
Body Mass Index, kg/m^2, mean (SD)	20.0 (2.8)
BMI Category, n (%)	
Underweight	140 (33.3)
Normal weight	220 (52.4)
Overweight and Obesity	60 (14.3)
Birthplace, n (%)	
Phnom Penh	36 (8.6)
Other provinces	384 (91.4)
Marital status, n (%)	
Single	394 (93.8)
Married	26 (6.2)
Living status, n (%)	
Family	255 (60.7)
Friend	87 (20.7)
Alone	71 (16.9)
Other	7 (1.7)

Table 1. Demographic Characteristics of Study Participants (n=420) (cont.)

Characteristics	Participants (n=420)
Field of study, n (%)	
Nursing	326 (77.6)
Midwifery	94 (22.4)
Education, n (%)	
First year	220 (52.4)
Second year	117 (27.8)
Third year	83 (19.8)
Average monthly allowance (US Dollar) n (%)	
Less than 100	201 (47.8)
Between 100-200	151 (36.0)
Between 201-300	44 (10.5)
More than 300	24 (5.7)
Physical activity, n (%)	
Less active	180 (42.8)
About as active	102 (24.3)
More active	138 (32.9)
Smoking status, n (%)	
No	419 (99.8)
Yes	1 (0.2)
Alcoholic beverage consumption, n (%)	
No	306 (72.9)
Yes	114 (27.1)

The average amount of SSBs intake was 11.1 ounces per day, providing 40.8 grams' sugar and 298 kilocalories. The discrepancy between energy and sugar intake in this study was due to the fact that the energy from SSBs (both fresh-made and commercial) does not only come from sugar but also other ingredients in the recipes (e.g., cream, milk, etc.). Therefore, 40 g of sugar only accounts for 160 kcal (53%) of total energy from SSBs. Iced tea (6.1 oz.) and fruit juice (6.0 oz.) had the highest mean daily intake followed by coffee with sugar (5.5 oz.), fruit frappe (4.6 oz.), soft drinks (4.4 oz.), carbonated soda (4.2 oz.), and energy drinks (3.5 oz.) (**Figure 1**).

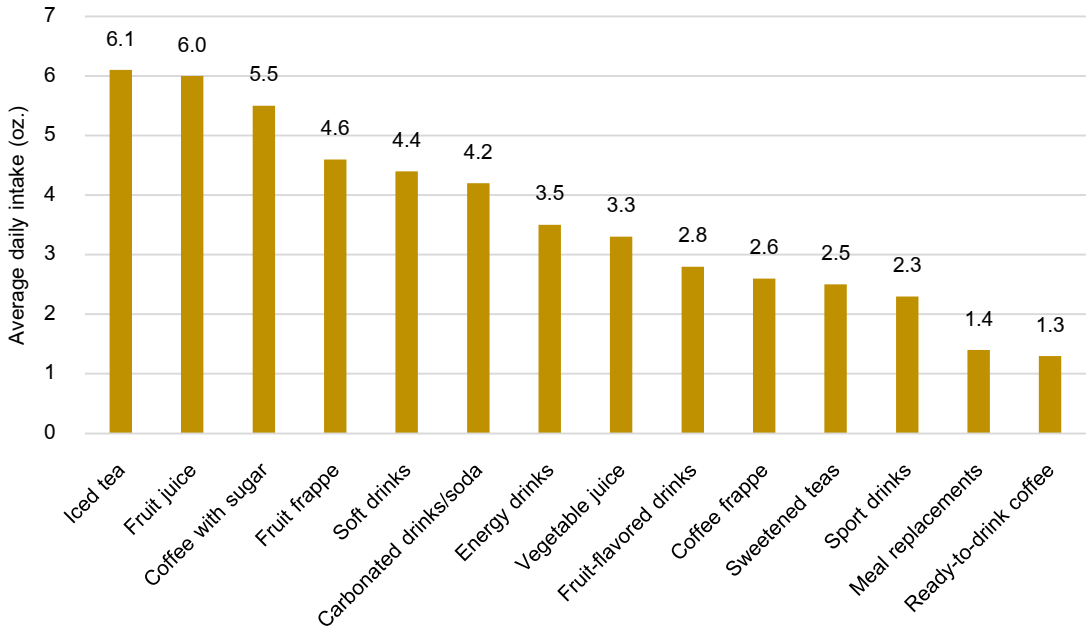


Figure 1. Average Intake of Different Types of SSBs per Day among Participants (n=420)

Students with higher self-efficacy scores (≥3) exhibited significantly lower intakes of SSBs compared with those with lower self-efficacy (<3). Knowledge scores (<5 vs. ≥5) and accessibility scores (<3.67 vs. ≥3.67) were not associated with total SSBs intake, as higher scores in these domains were not related to either higher or lower consumption levels (**Table 2**).

Table 2. Average Intake of SSBs among Participants according to Knowledge, Self-efficacy, and Accessibility Scores (n=420)

Variables	Knowledge[2]			Self-efficacy[2]			Accessibility[2]		
	Low (<5) (n=262)	High (≥5) (n=158)	*p*-value	Low (<3) (n=227)	High (≥3) (n=193)	*p*-value	Low (<3.67) (n= 184)	High (≥3.67) (n=236)	*p*-value
Total SSBs intake (oz./day)[1]	12.9 (16)	9.9 (11)	0.31	12.8 (17)	9.5 (12)	**0.002**	11.4 (15)	10.8 (14)	0.63

[1]Results are shown as median (interquartile range).

Score distributions of knowledge, self-efficacy, and accessibility towards SSBs consumption among nursing and midwifery students are described in **Figure 2**. Among the 420 students, the majority exhibited low knowledge of SSBs (62% scored below 5). Over half (54%) reported low self-efficacy in limiting SSBs intake, while 46% reported higher self-efficacy. In contrast, SSBs accessibility was relatively high, as 56% scored ≥3.67, which may reflect the widespread availability and ease of acquisition.

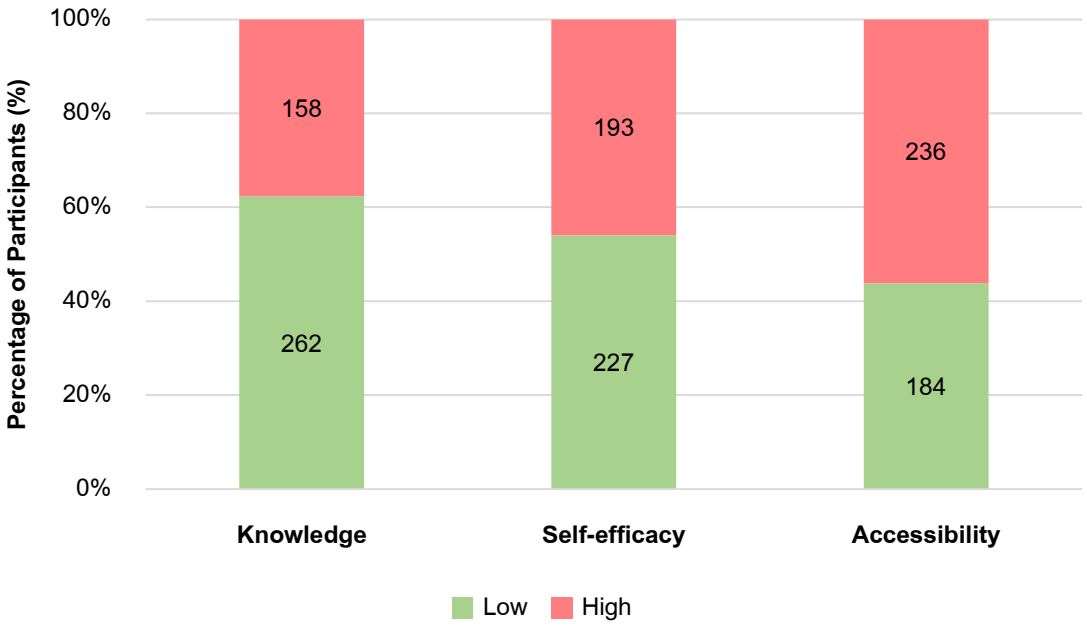


Figure 2. Distribution of Knowledge, Self-efficacy, and Accessibility Scores (High vs. Low) among Participants (n=420)

Table 3 shows the results of univariate and multivariate regression analyses examining factors associated with the total amount of SSBs consumption. After adjusting for potential covariates, students with high self-efficacy reported consuming approximately 4.5 oz. of SSBs less than those with low self-efficacy daily (β = -4.48, SE = 1.76, p = 0.001). Knowledge and accessibility were not significantly associated with total SSBs consumption.

Table 3. Univariate and multivariate models of factors associated with total SSBs intake among participants (n=420)

Variables	Univariate Model		Multivariate Model	
	β (SE)	*p*-value	β (SE)	*p*-value
Age	-0.11 (0.36)	0.76	-0.03 (0.44)	0.94
Gender				
Female	**Reference**		**Reference**	
Male	**4.15 (2.02)**	**0.04**	3.01 (2.15)	0.16
Other	-0.38 (4.91)	0.94	-2.16 (4.97)	0.67
BMI Category				
Normal weight	**Reference**		**Reference**	
Underweight	-3.37 (1.94)	0.08	-3.51 (1.92)	0.07
Overweight/obesity	0.50 (2.61)	0.85	-0.36 (2.59)	0.89

Table 3. Univariate and multivariate models of factors associated with total SSBs intake among participants (n=420) (cont.)

Variables	Univariate Model		Multivariate Model	
	β (SE)	*p*-value	β (SE)	*p*-value
Birthplace				
Province	**Reference**		**Reference**	
Phnom Penh	0.70 (3.14)	0.82	1.31 (3.08)	0.67
Marital Status				
Single	**Reference**		**Reference**	
Married	-4.56 (3.64)	0.21	-2.49 (3.86)	0.52
Living Status				
Family	**Reference**		**Reference**	
Friends	-1.39 (2.22)	0.53	-1.76 (2.23)	0.43
Alone	4.77 (2.40)	0.05	4.49 (2.39)	0.06
Other	11.56 (6.85)	0.09	9.21 (6.76)	0.17
Field of Study				
Nursing	**Reference**		**Reference**	
Midwifery	2.30 (2.11)	0.28	2.34 (2.32)	0.31
Educational Level				
First year	**Reference**		**Reference**	
Second year	0.06 (2.06)	0.98	0.19 (2.14)	0.93
Third year	-1.75 (2.32)	0.45	-2.14 (2.56)	0.40
Monthly Allowance				
Less than 100 USD	**Reference**		**Reference**	
100 – 200 USD	3.53 (1.93)	0.07	2.25 (1.94)	0.25
201 – 300 USD	-0.13 (2.99)	0.97	-0.20 (3.02)	0.95
More than 300 USD	3.83 (3.88)	0.32	2.60 (4.06)	0.52
Physical Activity				
About as active	**Reference**		**Reference**	
Less active	0.18 (2.22)	0.93	-0.92 (2.22)	0.68
More active	-4.18 (2.34)	0.08	-4.88 (2.30)	0.34

Table 3. Univariate and multivariate models of factors associated with total SSBs intake among participants (n=420) (cont.)

Variables	Univariate Model		Multivariate Model	
	β (SE)	*p*-value	β (SE)	*p*-value
Alcohol Consumption				
No	**Reference**		**Reference**	
Yes	2.67 (1.97)	0.18	1.32 (1.98)	0.51
Knowledge				
Low (<5 pts)	**Reference**		**Reference**	
High (≥5 pts)	-2.93 (1.81)	0.11	-3.06 (1.80)	0.09
Self-efficacy				
Low (<3 pts)	**Reference**		**Reference**	
High (≥3 pts)	**-5.53 (1.74)**	**0.002**	**-4.48 (1.76)**	**0.01**
Accessibility				
Low (<3.67 pts)	**Reference**		**Reference**	
High (≥3.67 pts)	-0.79 (1.77)	0.66	-0.31 (1.75)	0.86

DISCUSSION

This study explored theoretical factors associated with SSBs consumption among nursing and midwifery students in Phnom Penh, Cambodia. The findings highlight a potential key factor, particularly self-efficacy, that may influence SSBs consumption in this specific population.

In this study, nursing and midwifery students consumed on average 40.8 grams of sugar per day from SSBs, which is consistent with other studies conducted in similar populations. For example, a study reported that dental students in Thailand consumed an average of 40 grams of sugar from SSBs[30]. The numbers are lower than those in a study in Malaysia and South Korea, in which the mean daily sugar intake from SSBs among the students was 59 grams[31] and 61 grams[32], respectively. Young adults may be drawn to SSBs due to their appealing taste, quick energy boost, and convenience. Furthermore, social influence, marketing, and advertising also play a significant role, as these drinks are often associated with feelings of fun and socializing[33]. Additionally, many young adults are not fully aware of the health risks associated with excessive consumption but often noticed that sugary drinks may offer emotional comfort in stressful moments[34]. All these factors may contribute to high levels of SSBs consumption in this population.

Our findings indicate that more than half of the students appeared to have low self-efficacy toward limiting SSBs consumption (227 students; 54%). Interestingly, students with higher self-efficacy reported lower SSBs consumption compared to those with lower self-efficacy. This finding is consistent with previous studies

showing that self-efficacy is an important determinant of dietary choices, particularly regarding SSBs consumption[35–38]. Self-efficacy is the belief in one's ability to successfully perform a specific task or behavior. People with high self-efficacy are more likely to manage their behaviors, overcome challenges, and stay motivated to make healthier choices[39]. They are better at planning for obstacles, sticking to health goals, monitoring progress, and seeking social support. High self-efficacy also encourages positive behaviors by reinforcing the belief that their choices have long-term benefits. For example, someone confident in their ability to make healthier choices may understand the risks of sugary drinks and use this to motivate themselves to cut back drinking.

In this study, knowledge was not associated with SSBs consumption, which may indicate that awareness of health risks alone may be insufficient to change behavior in this specific population. The results were consistent with previous studies in Indonesia[40], Taiwan[35], Thailand[30], and Malaysia[41]. However, knowledge-based interventions appear to be effective in reducing SSBs intake among general younger populations[42], particularly those with lower baseline health literacy[43]. In this study, nursing and midwifery students' beverage choices may be largely influenced by habits, stress, convenience, and social norms, rather than lack of awareness or knowledge. A study among U.S. adults found that while most subjects knew sports drinks contained sugar, this knowledge was not significantly associated with their actual consumption of the drinks[44]. Despite understanding the health consequences of excessive sugar intake, students often continue to consume SSBs may be due to delayed consequences, taste preferences, cravings, social and cultural factors or conflicting messages[45]. Therefore, while knowledge is important, knowledge-based interventions may be less effective in reducing SSBs consumption in this specific population. This highlights the potential need for interventions beyond knowledge dissemination alone.

Our findings showed no significant difference in SSBs consumption based on accessibility scores, diverging from previous research, such as studies in Canada[46], that linked higher availability to increased intake. This lack of association may stem from the abundant presence of SSBs around nursing and midwifery students in Phnom Penh, including campus shops and vending machines. Such widespread access results in minimal variability among participants, likely reducing statistical impact. Nevertheless, since school-based accessibility interventions have proven effective elsewhere, strategies to reduce SSB accessibility on campus may remain theoretically sound to help decrease SSBs intake.

Implications for Policy and Practice

The results from this study highlight that self-efficacy, apart from knowledge alone, may be a promising target for nutrition interventions to reduce SSBs consumption within the unique academic and clinical contexts among nursing and midwifery students. To bridge the intention-behavior gap, health promotion strategies[47] may consider utilizing self-efficacy building strategies such as enactive mastery (i.e., behavioral skills training in goal setting and self-monitoring) and vicarious experiences (i.e., peer support groups

and shared success stories) apart from standard nutrition education. Additionally, addressing physiological states may also be important as helping students manage stress-related triggers could prevent emotional states from lowering their self-efficacy.

Strengths and Limitations

The main strength of this study is the utilization of SCT to explain SSBs consumption, allowing the identification of key theoretical constructs that can inform the design of targeted, theory-driven interventions. Additionally, the questionnaire provided a detailed assessment of beverages intake, an area that remains relatively understudied in Cambodia, and may serve as a useful tool for future research in similar populations. However, several limitations should be considered. First, the use of convenience sampling from a single university, albeit large, limits the representativeness and generalizability of the findings. Second, the cross-sectional design does not allow causal inference. Third, SSBs intake was assessed using a self-reported questionnaire. While the researcher applied measures to ensure that the answers would be reliable, the nature of self-report may still be affected by recall bias and social desirability bias. Fourth, the knowledge, self-efficacy, and accessibility questionnaires were adapted and translated for this study. Although content validity and internal consistency were assessed, these measures may not fully capture all dimensions of the constructs in this population. Furthermore, the cut-off points were based on the median values of the observed score distributions rather than externally validated thresholds; therefore, comparisons between “low” and “high” groups should be interpreted cautiously within this specific group. Future research should consider longitudinal or experimental designs to better establish causal relationships and examine changes in SSBs consumption over time, such as following students throughout their university years to determine whether variations in SSBs intake are associated with subsequent health and nutrition outcomes.

CONCLUSION

This study found that higher self-efficacy was associated with lower sugar-sweetened beverage intake among Cambodian nursing and midwifery students, whereas knowledge and accessibility were not significantly associated with SSBs intake. Given the cross-sectional design, these findings should be interpreted as associations rather than evidence of causality. However, future interventions to reduce SSBs consumption in this population may consider strategies that strengthen self-efficacy, such as goal setting, self-monitoring, and peer support, apart from standard knowledge-based nutrition education. Because health professional students serve as future role models, supporting their healthy lifestyle choices may offer significant broader societal benefits.

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