INFLUENCES ON RURAL THAI ADOLESCENTS' DRINKING INTENTION, ONSET, AND PATTERNS

By

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ABSTRACT

Early onset of alcohol drinking is problematic among rural Thai adolescents and can lead to poor health consequences. Adolescents' drinking onset and behaviors are highly influenced by their drinking intention. Within a media-rich environment, adolescents' intention to drink at a young age can be determined by their psychosocial and environmental factors, including alcohol-related media exposure. Nevertheless, it remains elusive how psychological and environmental factors can influence rural Thai adolescents' drinking intention and behaviors. Therefore, three dissertation aims (DAs) were employed to advance the scientific understanding and theoretical underpinnings about rural Thai adolescent drinking intention and behavior.

In DA1, an integrative review was conducted to update the state of science by clarifying how adolescents' perceived drinking norms (PDNs) were operationalized in the existing literatures (n=31). The findings revealed that adolescents' PDNs derived from parents, friends, and pro-drinking message exposure from various online platforms were highly associated with their drinking intention and behaviors (i.e., drinking onset and patterns). Two knowledge gaps were identified including the need to expand the narrow domain of adolescents' drinking norms; and to further understand the impacts of alcohol-related media exposure on adolescents' drinking intention and patterns.

In DA2, incorporating a broader aspect of PDNs, a structural equation model (SEM) was performed to examine the influence of psychosocial factors of the Theory of Planned Behavior (TPB) on rural Thai adolescents' drinking intention and behaviors. The results demonstrated that all adolescents' psychosocial factors contributed significantly (β_{range} = 0.16-0.52, p <.01) to the prediction of drinking intention (R^2 = 0.84), which subsequently influenced their drinking onset, current drinking, and binge drinking in the past 30 days. PDNs emerged as the strongest

psychosocial predictor of drinking intention. Adolescents' drinking intention significantly mediated the relationship between all psychosocial factors and drinking behaviors either fully or partially. The only different association between adolescent males and females was the path-coefficient from drinking attitude to drinking intention.

Finally, in DA3, another SEM was carried out to further examine the influence of alcohol-related media exposures on the TPB-based psychosocial factors and rural Thai adolescents' drinking intention as well as explore the potential mediators and moderators on these associations. The finding demonstrated that, compared to anti-drinking message exposures, pro-drinking message exposure had significantly stronger negative impacts on adolescents' PDNs, attitudes, PBC, and subsequently their drinking intention. Even though the mediation effects were comparable between males and females, the negative effect of pro-drinking message exposures on adolescents' PBC was significantly stronger for males (β= -0.76 vs -0.58).

Taken together, this dissertation's findings highlighted a paradigm shift in the way rural Thai adolescents perceive their drinking norms. It is critical to focus on adolescents' PDNs when examining their drinking intention and behaviors. Moreover, the findings filled an essential knowledge gap regarding the role of alcohol-related media exposures on adolescents' drinking intentions and behaviors. This nuanced understanding offers valuable recommendations for researchers and Thai policymakers to tackle the issue of underage drinking among rural Thai adolescents more effectively.

This dissertation is dedicated to Mom and Dad,
who are the role models of strength and patience that such a journey involves.
Also, to my own faith and endeavor, which led me to accomplish this work.

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CHAPTER 1: INTRODUCTION

Purpose

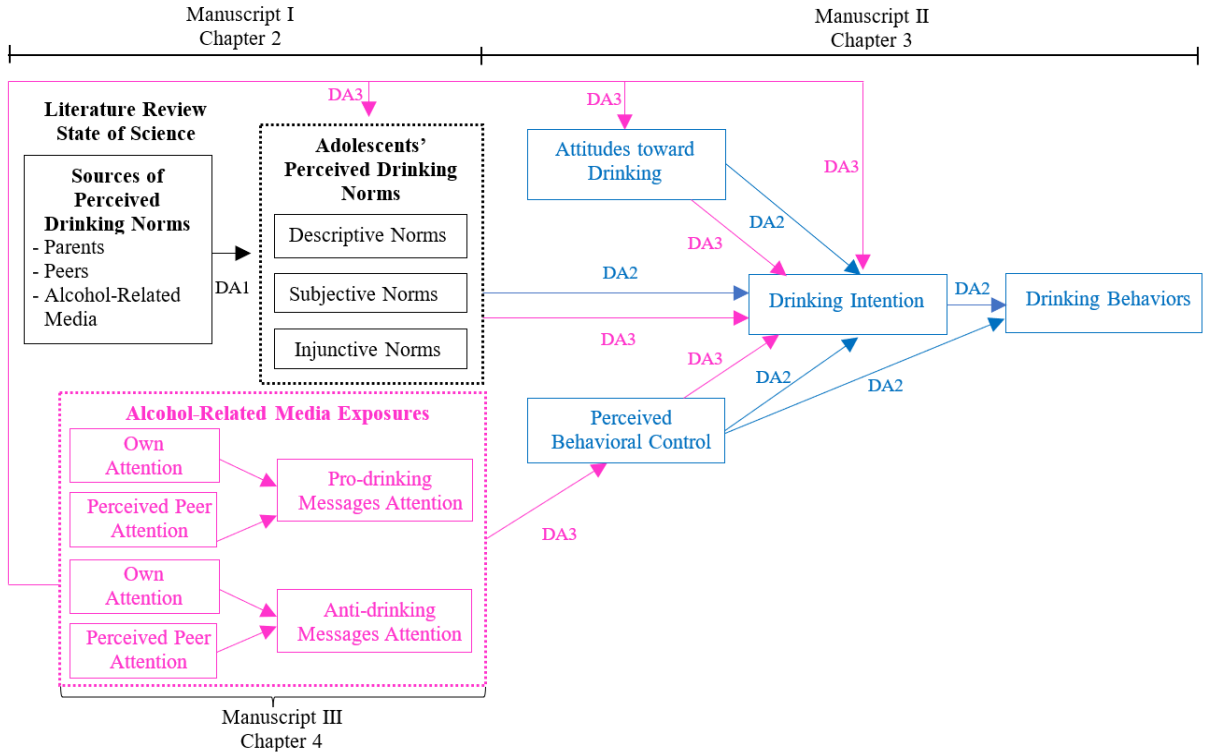
The overall objective of this dissertation is to advance nursing science related to underage alcohol drinking, specifically among rural Thai adolescents. This objective was accomplished in three ways. First, an integrative literature review was conducted that updates the current state of behavioral science by clarifying how adolescents' perceived drinking norms coming from parents, peers, and media affect their drinking intention and behaviors (drinking onset and past 30-day drinking patterns). Second, the influence of psychosocial factors (i.e., perceived drinking norms [PDNs], including descriptive, subjective, and injunctive norms; attitude toward drinking; and perceived behavioral control [PBC]) on adolescents' drinking intention and behavior were examined in a sample of rural Thai adolescents (n= 474). Finally, the impact of alcohol-related media exposure (pro- and anti-drinking message attention) as an environmental factor was examined in relation to the psychosocial factors (PDNs, PBC, and drinking attitude) of the Theory of Planned Behavior (TPB) and adolescents' drinking intention. Increased understanding of how alcohol-related media exposures have influenced adolescents' psychosocial determinants and, in turn, shaped their drinking intention could shed light on development of effective programs to prevent adolescents from engaging in underage drinking. This dissertation work also facilitates theoretical understanding about rural Thai adolescents' alcohol misuse, specifically drinking intention, onset, and behaviors (Chen et al., 2012; Das et al., 2016).

Dissertation Format

The objectives of this dissertation are examined in detail in Chapters 2, 3, and 4, with the focus on exploring factors that may be associated with rural Thai adolescents' drinking intention and behaviors. Each of the three chapters will serve as the basis for a manuscript (see Figure

1.1). The specific focuses of the these chapters are to 1) update the state of the science of adolescents' perceived drinking norms toward alcohol misuse by conducting an integrative literature review; 2) examine the role of psychosocial factors of the TPB and biological sex on rural Thai adolescents' drinking intention and behaviors (drinking onset, current and binge drinking patterns); and 3) examine how alcohol-related media exposure may influence rural Thai adolescents' psychosocial factors of the TPB and drinking intention; how the relationships between alcohol-related media exposures and drinking intention were mediated by these adolescents' psychosocial factors; and how these associations may differ by their biological sex. Lastly, Chapter 5 focuses on the conclusions and provides a discussion of the overall purpose of this dissertation.

Figure 1.1: The overview of the combined operational model



Note: DA indicated dissertation aim

Background and Significance

Significance of the Problem

A very early age of alcohol drinking–which refers to drinking before the age of 14 (Donovan & Molina, 2011)–is problematic and is associated with many long-term adverse health consequences, including accident-related disability (Gore, 2011), cognitive impairments (Courtney et al., 2019; Lees et al., 2020), and chronic diseases in adulthood (i.e., liver cirrhosis, pancreatitis, hepatitis, hypertension, and anemia) (Centers for Disease Control and Prevention [CDC], 2022a; Hagström et al., 2018; National Institute of Alcohol Abuse and Alcoholism [NIAAA], 2022). Despite the known adverse effects, the average age of alcohol drinking initiation is continuously getting younger (mean =12.8 years) overall for Thai adolescents (Assanangkornchai & Vichitkunakorn, 2020), and even younger (mean =11.3 years) for rural Thai adolescents (Luecha et al., 2019; Sae-ngow et al., 2016). Moreover, the incidence of drinking before the age of 12 years among rural Thai adolescents has increased 13.1% over the past decade (Assanangkornchai & Vichitkunakorn, 2020). These statistics demonstrate the seriousness of the underage drinking problem in rural Thai adolescents.

Research has shown that adolescents' early drinking onset is highly influenced by their beliefs and motivation toward drinking or the intention to drink (Adolfsen et al., 2014; Bhochhibhoya & Branscum, 2018). However, consistent with the TPB, adolescents' intention to start drinking is determined by three psychosocial factors including their 1) perceived behavioral beliefs about drinking (attitude toward drinking), 2) perceived normative beliefs about whether their parents and/or peers would approve or disapprove if they are drinking (subjective norms), and 3) perceived beliefs in exercising control over alcohol use (PBC) (Ajzen, 1991; Ajzen, 2011; Cooke et al., 2016; Cutrín et al., 2020). Thus, to delay adolescents' drinking onset, understanding

these psychosocial factors contributing to rural adolescents' drinking intention and behaviors is critical, particularly when they are at increased risk for underage drinking (Fishbein & Ajzen, 2010; Phuphaibul et al., 2011).

Alcohol Misuse at an Early Age

Alcohol misuse among adolescents and adults is defined differently depending on the quantity of alcohol involved (NIAAA, 2022; Noël, 2014). Alcohol misuse in adults refers to having greater than two standard drinks (any alcoholic beverage containing14 grams or 0.6 fluid ounces of pure alcohol) a day for men or one standard drink for women, while for adolescents, drinking more than a few sips is considered alcohol misuse (CDC, 2022b). Although access to alcoholic beverages is prohibited for individuals who are younger than 21 years in the U.S., a 2019 nationwide survey found that 39.7% of adolescents (aged 12 to 17 years) have consumed at least 1 standard drink in the past 30 days (Substance Abuse and Mental Health Services Administration [SAMHSA], 2022). In addition, about 21% of American high school students have already tried alcohol, with the average age of alcohol initiation around 13 years (Johnston et al., 2019). Even more importantly, a national survey conducted in 2018 by Kann et al. (2018) indicated that approximately 12% of U.S. high school students have engaged in binge drinking (described as ≥4 standard drinks for females or ≥5 standard drinks for males; CDC 2022b) at least once in the past 30 days.

Globally, adults who abuse alcohol often begin their alcohol use in early adolescence (NIAAA, 2022a). In Thailand, early drinking onset (drinking before age 15) is a serious public health issue (CDC, 2022a). Thailand was ranked third in early initiation of alcohol consumption, compared to other Asian countries (World Health Organization [WHO], 2018). In fact, alcohol misuse at an early age contributes to an estimated 3.3 million deaths (5.9%) and is ranked as the

fifth leading cause of premature death worldwide (WHO, 2018). Drinking at a young age is problematic and positively associated with an increased risk of adverse physical, mental, and cognitive performance among adolescents (CDC, 2020a; NIAAA, 2022). Compared to those who begin drinking after the age of 21, adolescents who start drinking before age 15 are 3 times more likely to become regular heavy drinkers in adulthood (*RR*=3.36, 95% CI=2.98-3.78; Liang & Chikritzhs, 2013), 12 times more likely to be unintentionally injured, and 2 times more likely to have unplanned and unprotected sex (Hingson & Kenkel, 2004). Likewise, a nationwide retrospective cohort study found that alcohol misuse was significantly associated with poor academic performance and high levels of truancy among Norwegian adolescents (*OR*=2.12, 95% CI=1.79-2.50 and *OR*=2.59, 95% CI=1.98-3.36, respectively (Heradstveit et al., 2017).

In addition to health consequences, alcohol drinking can also negatively affect Thailand's economy directly by increasing health care expenditures and indirectly by increasing costs resulting from productivity losses caused by alcohol-related diseases and incidents (Center for Alcohol Studies [CAS], 2016). In 2018, the Thai government spent more than 81.8 billion Thai Baht (USD $2.6 billion) on health care expenditures for treating accidents and diseases caused by alcohol drinking (Komonpaisarn, 2019). In addition, Thailand's Center for Alcohol Studies (2020) reported that alcohol drinking increased the country's annual health care costs by 12.4% due to alcohol-related health problems in adults, and by approximately 8.8% as a result of alcohol-related accidents among adolescents. In fact, during a five-year period (2016–2020), the rate of health care service utilization increased by 12.8% in the emergency department of a provincial hospital due to alcohol-related accidents among Thai adolescents (Nakronping Hospital, 2020). These data clearly underscore the deleterious and potentially long-term impact of alcohol drinking on Thailand's economy.

Existing Underage Drinking Prevention Interventions

Currently, in Thailand, most underage drinking prevention interventions are educational and focus on students in middle- and high-school settings. The main components of the interventions were designed to improve adolescents' knowledge regarding adverse effects of early and frequent drinking and to strengthen adolescents' refusal skills (Chowchalard et al., 2018; Fungkajorn & Rodjakphai, 2016; Kantawong & Oupra, 2017; Phalasarn & Duangsong, 2011; Rungsuwan et al., 2019). A few studies targeted both individual and societal levels by improving adolescents' knowledge and refusal skills related to alcohol misuse while simultaneously fostering anti-underage drinking norms/attitudes in school and community settings. This line of inquiry resulted in greater decreases in drinking intention (d = 0.32, p<.001 [Kantawong et al., 2015]; d = 0.38, p< .01 [Srirattayawong et al., 2012]) and drinking behaviors among adolescents in intervention groups compared to those in control groups over a short time period (≤3 months). However, no long-term effects were observed from this approach.

To address the underage drinking problem in Thai adolescents, it is important to understand the characteristics of effective intervention programs conducted outside Thailand. For example, a few school-based interventions designed to delay adolescents' drinking onset and reduce their problematic drinking were conducted with middle- and high-school students in the U.S. (Clark et al., 2011; Gonzales et al., 2018), U.K. (Conrod et al., 2013), China (Shek & Yu, 2011), and Germany (Baldus et al., 2016). These school-based prevention programs were typically delivered as class-based lessons or extracurricular management interventions to whole populations potentially at risk for alcohol misuse (Foxcroft & Tsertsvadze, 2011; Hennessy & Tanner-Smith, 2015). The main approach applied in these school-based programs focused on the following three areas: (1) improving adolescents' knowledge and awareness regarding negative

consequence of alcohol misuse or abuse; (2) changing normative beliefs and/or attitudes toward drinking, strengthening self-esteem, and improving peer resistance skill; and (3) developing life skills such as decision-making, persuasive communication, problem solving, and/or refusal skills (Das et al., 2016; Foxcroft & Tsertsvadze, 2011; Hale et al., 2014; Strøm et al., 2014). While these school-based programs have been successful in delaying drinking onset and/or the frequency or quantity of adolescents' drinking behaviors, overall, the effect size was somewhat small (*Hedges'g* = 0.22, $p < .01$) (Strøm et al., 2014). In addition, the intervention effects were found mostly on a short-term (≤3 months) and intermediate (≥6 months) basis, while long-term effects (≥12 months) were not significant (Foxcroft & Tsertsvadze, 2011; Onrust et al., 2018; Strøm et al., 2014; Teesson et al., 2014).

To enhance the sustainability of school-based programs, some underage drinking prevention programs conducted in the U.S. (Koning et al., 2015; Marsiglia et al., 2016; Schinke et al., 2010), Australia (Toumbourou et al., 2013), and Sweden (Bodin & Strandberg, 2011) include an active parent involvement component to improve parenting support. These interventions offered parents trainings on family rules regarding drinking, parental support, family bonding, parent-child communication, conflict reduction, parental supervision, and/or parental monitoring, along with an anti-drinking school curriculum (Das et al., 2016; Strøm et al., 2014; Tripodi et al., 2010). These home- and school-based programs demonstrated significantly greater effects across a broad range of alcohol-related outcomes than school-based interventions alone. A medium effect size was reported by two meta-analysis studies ($d = 0.77$, $p < .001$ [de Vicente et al., 2017]; *Hedges' g* =−0.61, 95% CI = −0.83 to −0.40 [Tripodi et al., 2010]). In addition, when compared to school-based programs alone, the combined home- and school-based programs had relatively greater sustained effects (de Vicente et al., 2017; Strøm et

al., 2014; Tripodi et al., 2010). However, one notable challenge of these home- and school-based programs was the difficulty obtaining parents' active involvement (participation rates for the intervention group varied from as low as 42% to as high as 71%), which could compromise the programs' effectiveness (Das et al., 2016).

In brief, although previous school-based and combined home- and school-based interventions conducted in various countries showed a significant effect on delaying adolescents' drinking onset and/or decreasing their drinking frequency and quantity, their effects were short-term and only a few of them reported the long-term effects. Similarly, the alcohol prevention programs implemented in Thailand to date have not been largely effective because they 1) mostly addressed the individual level of knowledge and social skills development in order to dissuade adolescents' from having favorable attitudes toward drinking and reinforce their PBC to combat peer pressure (Griffin & Botvin, 2011; Newton et al., 2017; Strøm et al., 2014), and 2) lacked a theoretical underpinning of the intervention that reflected key psychosocial factors related to adolescents' early drinking onset (Chowchalard et al., 2018; Das et al., 2016). In addition, very little attention has been paid to manipulating drinking norms derived from peers who drink or from extensive pro-drinking media exposure in the adolescents' social environment (Griffin & Botvin, 2011; Hindmarsh et al., 2015; Ho et al., 2014; Onrust et al., 2018). Notably, less is known about the effects of psychosocial factors and alcohol-related media exposures on rural Thai adolescents' drinking intention and behaviors. This knowledge gap is a significant impediment to health care providers and researchers being able to successfully address the problem of underage drinking in adolescents and particularly within rural Thai communities. Thus, increased understanding of the psychosocial and environmental factors that contribute to rural Thai adolescents' drinking intention and behaviors would be beneficial for nurse scientists

who then can develop effective intervention strategies targeting these factors to effectively help adolescents buffer negative influences and subsequently improve health outcomes.

Extant research has shown that adolescents' drinking intention and behaviors are highly influenced by various environmental factors, including alcohol-related media exposures (Crosby et al., 2013; Sudhinaraset et al., 2016). Within a media-rich environment (Twenge et al., 2019), exposure to alcohol-related media filled with pro-drinking messages may shape adolescents' perceived drinking norms and attitudes toward drinking (Gentile et al., 2019; Ho et al., 2014). This consideration is important because today's adolescents are exposed to a high volume of alcohol-related media. Yet, there is a critical knowledge gap for better understanding how alcohol-related media exposure may affect rural Thai adolescent males' and females' drinking-related attitudes, perceived drinking norms, PBC, and drinking intention (Ho et al., 2014; Phuphaibul et al., 2011). To bridge these knowledge gaps, this dissertation has three specific aims.

Dissertation Aims (DA):

Aim 1 (DA1): Evaluate the state of the science of adolescents' perceived drinking norms toward alcohol misuse.

Aim 2 (DA2): Examine the role of psychosocial factors and biological sex on rural Thai adolescents' drinking intention and behaviors (drinking onset, current and binge drinking patterns).

Aim 3 (DA3): Examine the influences of alcohol-related media exposures on rural Thai adolescents' drinking intention and explore the potential mediators (psychosocial factors of TPB) and a moderator (biological sex) on these associations.

The findings from this dissertation would inform nurse researchers and policy makers in

Thailand of the need to develop effective intervention programs designed to delay adolescents' drinking onset and decrease drinking patterns, particularly among rural Thai adolescents.

Conceptual Framework

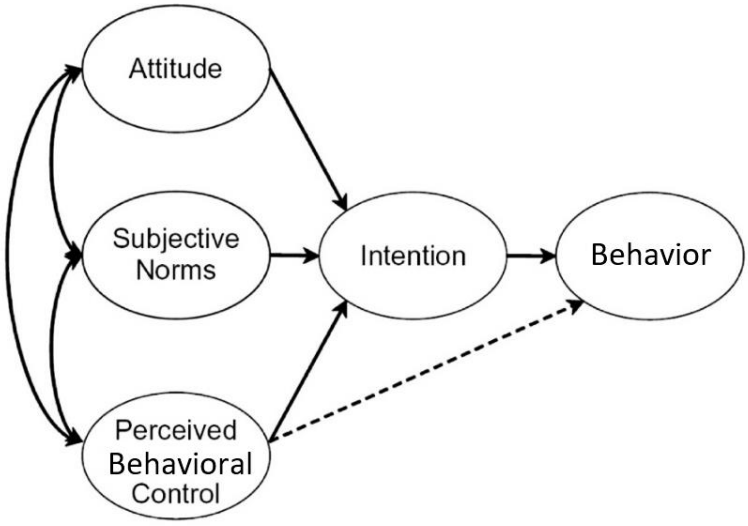
Applying and testing theoretical frameworks in nursing research and practice is vital for advancing nursing science and discipline itself (Smith & Liehr, 2018). The Theory of Planned Behavior (TPB) is a middle range theory that is widely applied in various types of health behavior research. The TPB has been utilized to predict and enhance understanding of psychosocial determinants across a wide range of adolescents' risky behaviors, such as risky sexual behaviors, eating behaviors, smoking, as well as alcohol drinking (Ajzen & Fishbein, 2005; Bhochhibhoya & Branscum, 2018). The TPB is philosophically rooted in the relationship between one's beliefs and performance of desired behaviors (Shak et al., 2012). The TPB originated in 1980 as the Theory of Reasoned Action (TRA), and the construct of PBC was later added to form the TPB model. This change was proposed as being necessary to increase the model's capacity to predict an individual's intention to engage in a particular behavior. It was assumed that individuals' behavior is reasoned in the sense that they are assumed to take into account that desired behavior's consequences (Ajzen & Fishbein, 2005). The developer of the theory (Ajzen, 1991) speculated that humans have volitional control over a desired behavior (once it is desired, they will realize they are sufficiently capable to perform the behavior).

Description of the Theory of Planned Behavior

The Theory of Planned Behavior (TPB) links one's beliefs and behavior (Ajzen, 1991). Among behavioral theories, the TPB is recognized as the theory that emphasizes the impact of psychosocial determinants on individual's behavioral intention and behaviors (Bhochhibhoya & Branscum, 2018; Cooke et al., 2016). The TPB (see Figure 1.2) has been successfully applied to

explain and predict drinking intention and behaviors for urban Thai adolescents and other adolescents across Western countries (Bhochhibhoya & Branscum, 2018; Cooke et al., 2016; Stoddard & Pierce, 2016).

Figure 1.2: The Theory of Planned Behavior (Ajzen, 1991)



The key component of this model is behavioral intention (Ajzen, 1991). The TPB distinguishes three types of perceived beliefs (behavioral, normative, and control) that could influence adolescents' intention toward alcohol drinking (Ajzen & Fishbein, 2005; Shak et al., 2012). Ajzen (1991; 2002) postulates that drinking intention represents an individual's motivation or conscious plan to engage in actual drinking behavior and is an immediate determinant of actual drinking behavior. Adolescents' drinking intention depends on their perceived behavioral beliefs about drinking (attitude), perceived normative beliefs regarding their friends' and/or parents' approval or disapproval toward alcohol use (subjective norms), and their perceived beliefs in exercising control over alcohol use (PBC) (Ajzen, 2011; Stoddard & Pierce, 2016).

Psychosocial Factors Related to Adolescent Underage Drinking

Prior research has shown that adolescents' drinking intention, onset, and patterns are

highly influenced by their psychosocial factors, including their cognition, beliefs, and motivation toward alcohol drinking (Bhochhibhoya & Branscum, 2018; Cooke et al., 2016). Psychosocial factors of the TPB—including drinking attitudes, subjective norms, and perceived control of alcohol use—are noted to relate to underage drinking problems among adolescents (i.e., drink before the legal age of 21 in the U.S.), especially those who are not regular drinkers (Ajzen, 2011; Phuphaibul et al., 2011). Moreover, increased drinking intention significantly predicts adolescents' early drinking onset (Adolfsen et al., 2014). The evidence supports that adolescents with high levels of drinking intention were 1.78 times more likely to engage in underage drinking than those with lower levels of drinking (Fisher et al., 2007). Thus, to delay adolescents' drinking onset, understanding the psychosocial factors that contribute to adolescents' drinking intention is a critical step toward understanding their drinking behaviors (Fishbein & Ajzen, 2010; Phuphaibul et al., 2011).

Drinking Intention. As a proximal outcome variable of the TPB model, drinking intention is a significant predictor of adolescents' actual drinking behaviors. In fact, Huchting et al. (2008) argue that drinking intention is a summary of the cognitive and affective mechanisms of the psychosocial factors of the TPB, including attitude toward drinking, subjective norms, and PBC. Drinking intention represents an indication of how much an individual is willing to try alcohol and how much effort the person is planning to exert in order to perform the drinking behavior (Ajzen, 1991; Hagger, 2019). Results from two studies supported intention as a strong predictor of drinking behavior. In one study, Craig et al. (2019) used a structural equation model to test the TPB in predicting alcohol drinking among 1,266 adolescents. The results showed that intention to drink had the highest degree of association with drinking pattern within 30 days (β = 0.52, $p < .05$). In the other study, Theerosiriroj (2012) investigated alcohol drinking intention

among Thai high school students. Findings showed that intention was the best predictor of both current, actual drinking pattern ($r = 0.73$, $p < .001$) and six months later ($r = 0.66$, $p < .001$), accounting for 53% and 44% of the variance, respectively.

Prior research also confirmed the potential effect of drinking intention as a significant predictor of adolescents' drinking onset (Adolfsen et al., 2014; Bekman et al., 2011). In a study conducted with 995 11 to 18-year-old U.S. adolescents (Fisher et al., 2007), a never-drinking group's willingness to drink alcohol (drinking intention) was identified as a significant factor associated with early onset of alcohol drinking in both male (*OR* = 1.78; 95% CI 1.35–2.33) and female adolescents (*OR*=1.37; 95% CI 1.31–2.19) after one year follow-up. Similarly, other researchers found that adolescents' drinking intention in the next month significantly increased the odds of earlier drinking onset among 1,648 U.S. adolescents (*OR* = 2.55, 95% CI 1.93–3.39; Bekman et al., 2011), and 1,550 Norwegian adolescents (*OR* = 1.9, 95% CI 1.7–2.1; Adolfsen et al., 2014). Although drinking intention has emerged as a significant predictor of adolescents' early drinking onset, factors contributing to rural Thai adolescents' drinking intention and onset remain elusive.

Drinking Attitudes (Behavioral Beliefs). Within the TPB, attitude toward drinking refers to the degree to which a person has a favorable evaluation of alcohol drinking (Ajzen, 2002; Hagger, 2019). Attitude entails a consideration of the outcomes of drinking. Research has noted that a more acceptable attitude toward drinking is related to increased drinking onset (Payne et al., 2016), intention to drink (Cooke et al., 2016; Payne et al., 2016; Phuphaibul et al., 2011), and drinking patterns (Kuther & Higgins-D'Alessandro, 2003; Payne et al., 2016; Stoddard & Pierce, 2016). Payne et al. (2016) applied the TPB to understand drinking intentions among 868 U.S. adolescents, ages 12 to15 years. The path analysis revealed that attitude toward drinking

significantly and longitudinally predicted adolescents' drinking intention ($\beta = 0.19$, $p < .001$) and onset among a nondrinker group after 1-year follow-up ($\beta = 0.39$, $p < .001$). Correspondingly, Phuphaibul et al. (2011) found that for Thai high school students, those with a favorable and endorsing attitude toward drinking were more likely to drink in the next 30 days ($\beta = 0.42$, $p < .001$).

Alternatively, the association of adolescents' positive/endorsing attitudes toward alcohol drinking and their drinking behaviors has also been documented. Lin et al. (2012) demonstrated that having favorable attitudes toward alcohol increased the likelihood of being a drinker among 2,538 New Zealand adolescents aged 12–15 years (*OR* = 4.56, 95% *CI* = 3.62–5.76). Also, Jackson and colleagues (2016) reported that favorable and endorsing attitudes were related to higher odds of past-month binge drinking behavior among 5,018 New Zealand secondary school students (*OR* = 3.36, 95% *CI* = 2.44–4.09). Although adolescents' attitudes toward drinking significantly affect their drinking intention, onset, and patterns, the magnitude of influence varies by adolescents' cultural beliefs (Kropp, 2004; Payne et al., 2016). Thus, to understand rural Thai adolescents' drinking intention, onset, and patterns, their attitudes toward drinking should be considered within the cultural context, particularly because restrictions on rural adolescents' alcohol use are much lower than for those living in urban communities.

Subjective Norms (Normative Beliefs). Within the TPB, subjective norms refer to the perceived normative beliefs of whether reference persons (parents and/or peers) approve or disapprove of drinking behavior (Ajzen, 2002; Ajzen & Fishbein, 2005). Subjective norms are considered to be one of three psychosocial factors found to be major independent antecedents of drinking intention and, ultimately, actual drinking behaviors. Adolescents' normative beliefs regarding drinking are often shaped by seeing how others act, respond, or behave regarding

alcohol misuse, which can subsequently interfere with adolescents' drinking intention and behaviors (Cail & LaBrie, 2010; Nash et al., 2005). Existing studies conducted in the U.S. and Belgium noted that higher perceived parental approval (Sharmin et al., 2017; Zucco et al., 2017) and peer approval of alcohol use (Beullens & Vandenbosch, 2016; Randolph et al., 2018) increased drinking intention. However, Hasking and Schofield (2015) found that subjective norms strongly predicted drinking intention among 258 Australian adolescents ($\beta = 0.37$, $p < .001$).

Perceived drinking norms from parents and peers have been associated with adolescents' earlier drinking onset. Randolph et al. (2018) reported that having a parent who regularly drank alcohol increased the risk of early drinking initiation (*RR* = 1.69; 95% *CI* = 1.41–2.02), while Mundt (2011) confirmed that having each additional regular drinking friend increased the risk of early drinking onset by as much as 34%. Correspondingly, a study (Nesi et al., 2017) conducted among 658 U.S. high school students found that adolescents' perceived approval of alcohol drinking positively predicted their past 30-day drinking ($p < .01$) and binge drinking behavior ($p < .001$), while having a parent who regularly drank alcohol increased the risk of increased adolescent drinking one year later (*RR* = 2.17; 95% *CI* = 1.18–3.99; Randolph et al., 2018). Furthermore, adolescents' attitudes and subjective norms toward drinking are developed through interactions with their parents and/or peers (Stoddard & Pierce, 2016). However, it is important to note that other studies, also guided by the TPB, failed to find a significant association between subjective norms and adolescents' drinking intention and onset (Junyeam & Yuttatri, 2016; Spera, 2004). This issue might be the result of the narrow definition of subjective norms in the TPB.

One shortcoming of the TPB is its limited consideration of the social drinking norms that

exist at the societal level, particularly when alcohol drinking is often described as a social lubricant (Sudhinaraset et al., 2016). Within this context, subjective norms of the TPB (perception of approval or disapproval of parents and peers) alone may not be sufficient to represent all aspects of perceived societal drinking norms that may be associated with adolescents' drinking intention and behaviors (Cox & Bates, 2011; Kam et al., 2009; Rivis & Sheeran, 2003). Other aspects of perceived drinking norms should be considered, including descriptive norms (i.e., perceptions of what most people in society do and expect regarding drinking) and injunctive norms (i.e., perceptions of moral expectations regarding drinking) (François et al., 2017; Kantawong et al., 2021; Rimal & Lapinski, 2015). Increasing evidence supports the inclusion of all three aspects of social norms in order to fully capture adolescents' normative beliefs toward alcohol use derived from proximal (close friends, parents) and distal (virtual peers and idols) stimuli (Hong et al., 2012; Nesi et al., 2017). For example, adolescents' normative beliefs toward drinking can be shaped by their interactions with online peers on various social media platforms such as Facebook, Twitter, and Instagram (Brunborg et al., 2017; Cavazos et al., 2015; Nesi et al., 2017). In the current digital era, how adolescents perceive normative social behaviors with regard to alcohol use may be more complex than previously envisioned (Hong et al., 2012; Wong, 2019). Thus, considering a broader aspect of adolescents' perceived drinking norms, as illustrated in Figure 1.3, may be necessary since modern digital media explicitly offer ways for adolescents to interact with others across various societal levels (MacArthur et al., 2020; Underwood & Ehrenreich, 2017).

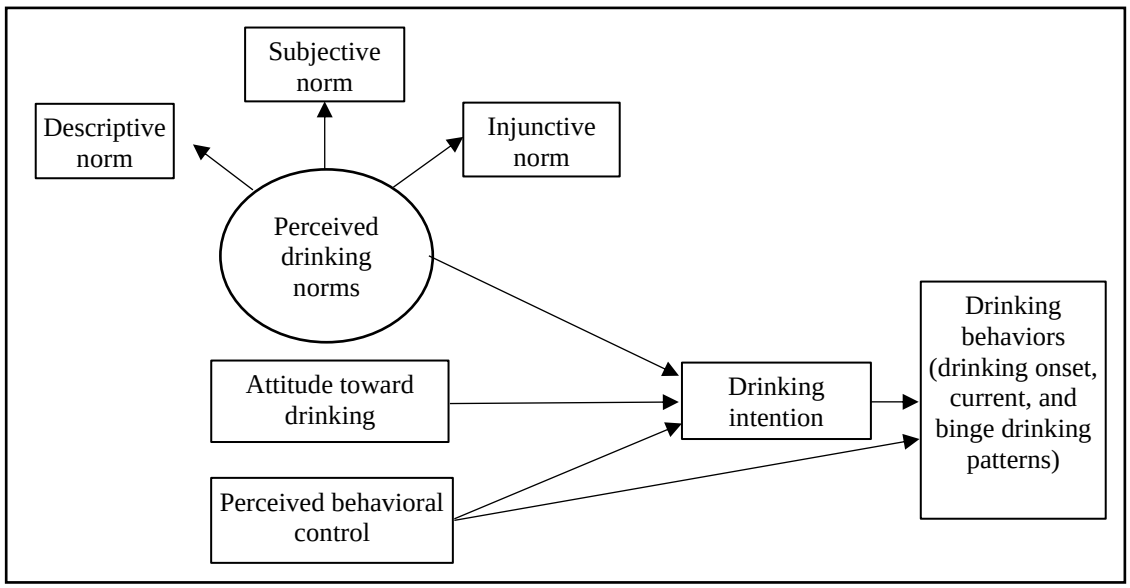
Perceived Behavioral Control (Control Beliefs). PBC is defined as the perceived ability of individuals to control their drinking behavior (Ajzen, 2002; 2011). It often reflects actual behavioral control (Glanz et al., 2002). A study (Wong et al., 2006) reported that PBC strongly

predicted drinking initiation among 256 U.S. adolescents ($\beta = -0.68$, $p < .001$). However, the studies regarding the relationship between adolescents' PBC and their age of first drinking (onset) are seldomly investigated in Thailand. In a study of 681 urban and high school Thai adolescents, Phuphaibul and colleagues (2011) found that PBC was a significant predictor of both drinking intention and behaviors. PBC explained 39.2% of the variance in adolescents' intention to drink within the next 30 days. Similarly, a meta-analysis revealed that PBC had a strong positive relationship with adolescents' drinking intention (Cooke et al., 2016). Despite these findings, its influence varied by adolescents' age (Saiyuet et al., 2018) and previous drinking experience (Barmpagianni et al., 2014; Huchting et al., 2008). For example, a study applying the TPB to predict adolescents' drinking intention and behaviors among Thai vocational students found that the influence of PBC on drinking intention among younger vocational students (ages 19–21 years) was slightly weaker than for older (ages 16–18 years) students (Saiyuet et al., 2018). Similarly, Junyeam and Yuttatri (2016) noted that the relationship between PBC and adolescents' binge drinking seemed stronger among Thai adolescents with no drinking experience. Therefore, although PBC emerges as a significant predictor of both drinking intention and behaviors in urban and older Thai adolescents, it is unclear whether it has is also predictive for rural and younger Thai adolescents (ages 13–15 years).

The drinking culture in Thailand is significantly different from that of Western cultures. Alcohol drinking is a well-accepted socializing behavior in rural communities, and alcoholic beverages are offered at almost all social events (Sae-ngow et al., 2016). It is relatively easy for rural Thai adolescents to perceive alcohol use as a routine part of life and subsequently assume/approve of drinking behavior (Ursin, 2016). For example, social acceptability of alcohol can affect adolescents' attitudes of acceptance toward alcohol drinking and indirectly trigger

adolescents' intention to drink early (Bhochhibhoya & Branscum, 2018). Thus, having a better understanding of the psychosocial factors that contribute to rural Thai adolescents' drinking intention and behaviors can help nurse researchers and health care specialists to develop culturally appropriate prevention programs to buffer negative influences from the environment and minimize the potential for negative health outcomes among adolescents.

Figure 1.3: The operational model for DA 2: adapted Theory of Planned Behavior



Environmental Factors Contributing to Underage Drinking

According to Bronfenbrenner's Ecological System Theory (EST), an individual's behaviors can be influenced by four dynamic environmental systematic levels: (1) microsystem—the significant group of people that an individual typically interacts with in daily life such as parents, siblings, peers, and teachers; (2) mesosystem—the interactions between the microsystems that shape one's life; (3) exosystem—the linkages between social settings that form an individual's experience-related behaviors such as neighborhood, mass media, and/or local policies; and (4) macrosystem—the overarching cultural context that influences the

developing one's behaviors, as well as those cultures embedded in the microsystem and mesosystem (Bronfenbrenner, 1986; Bronfenbrenner, 1994). The EST suggests that adolescents learn and perform their behaviors through the daily social interaction with different social system levels around them (Tudge et al., 2009). Likewise, in the case of underage drinking problems, existing research supports that adolescents' beliefs regarding drinking (perceived drinking norms) and attitudes toward drinking are substantially developed through their social interactions within the complex environmental systems (Lee, 2011; Rimal & Lapinski, 2015). Thus, to further understand environmental factors associated with rural Thai adolescents' drinking intention, onset, and patterns, the EST can be applied and explored simultaneously with the TPB to further understand the environmental factors associated with rural Thai adolescents' drinking intention and behaviors (see Figure 1.4).

Furthermore, prior research has shown that adolescents' drinking intention, onset, and patterns are influenced by various environmental factors, including alcohol-related media exposure (Crosby et al., 2013; Sudhinaraset et al., 2016). For adolescents growing up in the digital world, being "always online" to connect and interact with others is a powerful normative situation that is considered to be the *status quo* (Dolcini, 2014; Marino et al., 2020). In addition, living in a media-rich environment (Twenge et al., 2019), adolescents' exposure to pro-drinking messages may shape their perceived norms and attitudes toward alcohol use (Gentile et al., 2019; Ho et al., 2014). In one study, long-term alcohol-related media exposure was found to reduce adolescents' PBC in resisting peer pressure (Kantawong et al., 2021). Thus, paying attention to the role of alcohol-related media exposure on the rural Thai underage drinking situation is critical because the majority of Thai adolescents spend between 7 and 10 hours a day using

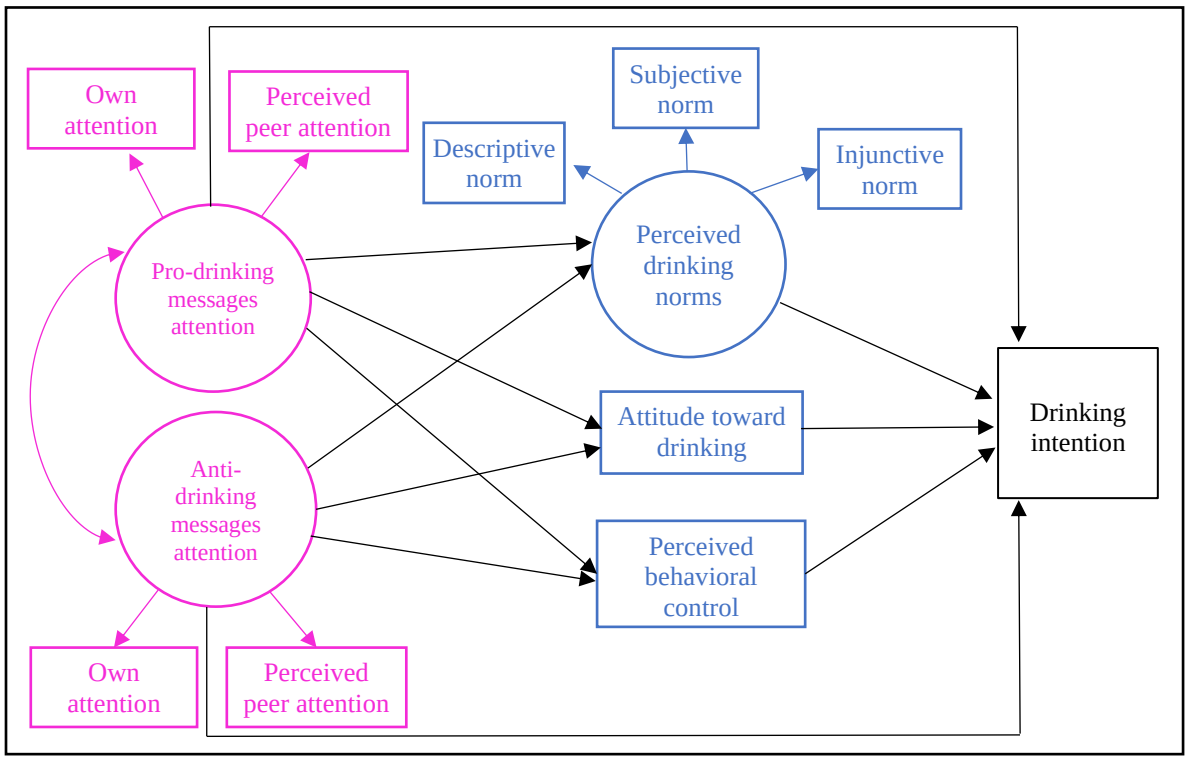
social media, and around three-quarters of them have regular exposure to various pro-drinking messages (National Statiscal Office, Thailand [NSO], 2020).

Adolescents' own attention and perceived peer attention to alcohol-related media can alter their normative beliefs toward drinking (Anderson et al., 2009). In Thailand, although there is a policy that limits the broadcasting of pro-drinking messages on the television before 10 pm, no policy exists to regulate pro-drinking messages on social media such as Facebook, YouTube, and Twitter (CAS, 2016). With increasing alcohol-embedded media exposure (NSO, 2020), rural Thai adolescents' intention to drink may be affected by this environmental factor (Gentile et al., 2019; Nesi et al., 2017). Ho et al. (2014) noted that for urban Thai adolescents, pro-drinking media exposure was strongly associated with attitudes of acceptance and perceived social norms toward drinking. While increased pro-drinking media exposure accelerated adolescents' drinking intention ($p < .001$), the mechanism of action (e.g., psychosocial determinants) that influences drinking intention remains unclear.

Unlike pro-drinking messages, very few anti-drinking messages are broadcast on electronic media in Thailand (Ho et al., 2014). In fact, anti-drinking advertisements are limited to television and only target adult drinkers (CAS, 2016). These anti-drinking messages have primarily focused on themes such as the harm and legal consequences that result from drunk driving and financial loss resulting from drinking (Thai Health Promotion Foundation, 2022). None of the existing anti-drinking advertisements inform adolescents about the negative consequences of underage drinking (Sathapitanont et al., 2011). It is unclear whether the attention that Thai adolescents and their peers pay to anti-drinking (or pro-drinking) messages affects their attitudes, perceived drinking norms, PBC, and intention to drink. In some existing studies conducted in Western countries, anti-drinking messages did not emerge as significant

predictors for adolescents' drinking intention or behaviors (Moreno et al., 2015; Russell et al., 2017). However, Ho and colleagues (2014) found that urban Thai adolescents' perceived peer attention to anti-drinking messages was, in fact, indirectly related to adolescents' drinking attitude and intention. These differences underscore a need for continued research in this area.

Figure 1.4: The operational model for DA 3: The role of alcohol-related media exposure on adolescents' psychosocial factors, drinking intention and behaviors (adapted from the TPB and Ecological Model)



Adolescents' Sociodemographic Factors and Parental Factors Related with Underage Drinking

Biological Sex. Adolescents' biological sex has been suggested as an important role in rural Thai adolescents' drinking intention and behaviors. Previous studies have noted that boys generally initiate alcohol earlier and consume more alcohol than girls (Adolfsen et al., 2014;

Kuntsche et al., 2015). In a study with urban Thai high school students (Phuphaibul et al., 2011), adolescents' biological sex significantly moderated psychosocial factors of the TPB in terms of adolescents' drinking intention. The biological sex differences may result from distinct perspectives, social factors, and peer drinking norms toward alcohol drinking (Dir et al., 2017; Phuphaibul et al., 2011), all of which could affect the relationships between the TPB's psychosocial factors and ultimately influence adolescents' drinking intention, onset, and patterns (de Visser & McDonnell, 2013).

Several studies based on the TPB demonstrated differences in adolescents' drinking perceptions and behaviors based on biological sex. A meta-analysis by Cooke et al. (2016) showed that the relationship between adolescents' attitude toward drinking and drinking intention was significantly stronger in girls than boys across 40 included studies ($x^2 = 50.39$, $p < .001$). Kyrrestad et al. (2020) employed the TPB to examine sex differences among Norwegian adolescents (n = 1,563) and found that boys had a higher prevalence of early drinking onset (≤15 years) than girls (28.8% vs. 19.2%). However, girls were more likely to report drinking during the past three months than boys (72.3% vs. 58.2%) after a two-year follow up. Interestingly, a qualitative study (Detpetukyon et al., 2018) revealed sex differences in the reasons contributing to drinking behaviors. For example, girls often drank alcohol because drinking gave them an increased sense of relaxation, strength, and self-confidence, whereas boys' alcohol consumption was associated with their need for peer acceptance and their transition to adulthood. Furthermore, masculinity was noted as a potential variable regarding early onset of alcohol drinking in male adolescents (Iwamoto & Smiler, 2013). In a study of 776 U.S. male adolescents, those who exhibited more masculine traits and conventions had an increased risk of binge drinking (RR = 5.01, 95% CI = 1.10–1.25) (Iwamoto et al., 2011). An implication from this finding is that masculinity, as a social

construct, encourages the belief that drinking means being a "real man" (Kirby & Kirby, 2017; Ragonese et al., 2019). Thus, it is critical to consider the potential role of biological sex while assessing the influence of psychosocial factors on rural Thai adolescents' drinking intention and behaviors.

Other Sociodemographic Factors. Research has identified a variety of adolescents' sociodemographic characteristics as possible confounders of their drinking intention, onset, and behaviors. For example, according to the Monitoring the Future study, a nationally representative survey of U.S. middle and high school students, 38% of ninth grade students (n = 1,680) reported past 30-day drinking during a baseline assessment in 2013. Surprisingly, the prevalence of underage drinking (<15 years) increased approximately 9% after a 3-year follow up (Johnston et al., 2019). Likewise, a nationwide school health study of 5,184 urban Thai adolescents indicated that older (ages 15–17 years) adolescents had 2.9 times considerably greater incidence of past 30-day drinking behavior than younger adolescents aged between 13–15 years (Chaveepojnkamjorn & Pichainarong, 2011). Another study conducted among 548 Thai high school students also found that the trajectory of adolescents' binge drinking increased with age, finding prevalence rates as high as 14.6%, 18.1%, and 19.8% among those aged 16, 17, and 18, respectively (Theerosiriroj, 2012).

In addition to the sociodemographic factors mentioned above, educational competence was found to play a role in adolescent drinking. A nationwide survey was carried out among a nationally representative sample of 22,424 U.S. adolescents revealed that adolescents with a lower grade point average (GPA) consumed a significantly greater number of alcoholic drinks (F (3, 942.65) = 75.719, p = .000) and engaged in binge drinking more often (F (3,726.98) = 34.996, p = .000) within the past two weeks than those with a higher GPA (Piazza-Gardner et al., 2016).

Similarly, Ansari et al. (2013) found that adolescents with higher GPAs (≥ 3.00) were more likely to have their first drink later in life than those with lower GPAs (β = -0.105, p = .045). Religious beliefs have also been noted as a possible factor associated with adolescents' drinking intention and behaviors. A study conducted among urban Thai adolescents (Luecha et al., 2019) found that Christian adolescents had a higher proportion (11.5 %) of past 30-days drinking than Buddhist (11.1 %) or Islamic (5.6 %) adolescents (χ^2 = 33.55, p < .001). Another study similarly found that religious beliefs concerning alcohol were noted as a potential factor in adolescents' alcohol involvement among 1,795 adolescents from the island of Mauritius, Madagascar (Luczak et al., 2015). The finding of this study demonstrates that, as a result of the Islamic doctrine's strong prohibitions against drug and alcohol use, lifetime alcohol drinking among Islam adolescents (15%) was significantly lower than for Hindu (78 %), Tamil (85 %), and Catholic (89 %) adolescents ($\chi 2$ = 433.1, p < .001). Therefore, these adolescent sociodemographic factors should not be neglected when examining adolescents' drinking intention and drinking behaviors.

Parental Factors. Within the family level, children are usually exposed to and learn about alcohol drinking from their parents from an early age (Koning et al., 2012). Parents play a powerful role in shaping their children's perceived norms (normative beliefs) and attitudes toward drinking, through their role-modeling of alcohol-related behavior (Gilligan & Kypri, 2012; Vermeulen-Smit et al., 2012). Notably, the negative influences of parental drinking have received the most attention, particularly during the early period of adolescence (Cranford et al., 2010; Janssen et al., 2014). Previous research has demonstrated that adolescents who were regularly exposed to parental drinking were 1.7 times more likely to initiate drinking early (Randolph et al., 2018), 1.9 times more likely to escalate from initiation to heavy drinking, and 2.3 times more likely to engage in heavy drinking frequently (Staff & Maggs, 2019), compared

to those who were not. Having a parent who habitually drank strongly predicted current drinking status (past 30-day drinking) among 1,032 Italian middle school students (*OR* = 7.11, 95% *CI* =5.02−10.08; Zucco et al., 2017).

In addition, parent marital status was another parental characteristic that has been noted to influence adolescents' drinking intention and behaviors. Prior research revealed that adolescents from divorced/separated families were more likely to initiate drinking early (*OR* = 1.65, 95% *CI* = 1.26–2.14; Jackson et al., 2016) and to have drunk alcohol in the past 30-days compared to those living with married parents (*OR* = 2.36, 95% *CI* = 1.78–3.14; Tomčíková et al., 2015). Similarly, adolescents' drinking onset and patterns are more likely to be negatively influenced by parents' educational levels. Studies found that having parents with low educational backgrounds (< high school) was significantly associated with greater frequency of adolescents' past month drinking (*OR* = 1.54, 95% *CI* = 1.07–2.22; Sharmin et al., 2017), and past month binge drinking (*OR* = 2.67, 95% *CI* = 1.17–6.06; Wells & Östberg, 2018). Family economic status was also found to be negatively correlated with adolescents' drinking patterns. Existing research revealed that adolescents with low-income families were more likely to engage in drinking within the past 30 days (*OR* = 2.67, 95% *CI* = 1.73–4.12; Sharmin et al., 2017) and past week binge drinking (*OR* = 3.14, 95% *CI* = 2.23–4.42; Bosque-Prous et al., 2017). In light of these findings, it is essential to consider parental and familial influences on adolescents' drinking intention and behaviors when examining rural Thai adolescents' alcohol misuse.

In summary, examining the influence of adolescents' psychosocial factors including perceived drinking norms, attitudes toward drinking, and PBC on rural Thai adolescents' drinking intention and behaviors (drinking onset, current, and binge drinking patterns) would enhance understanding of rural Thai adolescents' drinking behaviors. This understanding will

enable health specialists to develop culturally sensitive prevention programs to effectively delay adolescents' drinking intention and onset. In short, this dissertation aimed to enhance understanding about the potential role of psychosocial determinants on rural Thai adolescents' drinking intention and behaviors, particularly within the context of alcohol-related media (pro- and anti-drinking message attention) exposure (see Figure 1.4). The arrangement of this dissertation was in a three-paper format that will be covered comprehensively in the next three chapters.

Chapter 2 (Manuscript 1) consisted of an integrative review of adolescents' perceived norms toward alcohol misuse. This manuscript has been published in the *Western Journal of Nursing Research* (Kantawong et al., 2021). Guided by a comprehensive and rigorous method outlined by Whittemore and Knafl (2005), the manuscript was a thorough literature review in which both quantitative and qualitative studies were included and synthesized to understand Thai adolescents' perceived drinking norms from their parents, peers, and media exposure about alcohol misuse. The results confirmed the significant role of parents' and peers' attitudes toward alcohol drinking on adolescents' drinking intention. Pro-drinking media exposure was also noted to play an important role in adolescents' drinking intention. Finally, this review also revealed the need for future interventions to incorporate the impact of parents and online peers as well as perceived social norms derived from media exposure (i.e., Facebook and Twitter) in alcohol misuse prevention efforts.

Chapter 3 (Manuscript 2) extended the findings of the integrative literature review by adding adolescents' perceived norms toward drinking to the TPB. This manuscript examined the influence of psychosocial factors (perceived drinking norms, attitude toward drinking, and PBC) on rural Thai adolescents' drinking intention and behaviors (drinking onset, current, and binge

drinking patterns). The role of adolescents' age, biological sex, and parental factors on adolescents' drinking intention and patterns were explored as well. The manuscript was submitted to the *Journal of Adolescent Health* for consideration of publication.

Chapter 4 (Manuscript 3) extended the research conducted in Chapters 2 and 3 by incorporating an important aspect of the ecological model (Bronfenbrenner, 1994; Bronfenbrenner & Morris, 2006) and adding alcohol-related media exposure (pro- and anti-drinking message attention) to the TPB to understand its effects on rural Thai adolescents' drinking intention. We plan to submit this manuscript to the *Youth & Society* for their consideration for publication.

Chapter 5 (Conclusion) provides a summary of the dissertation across all three manuscripts and synthesizes its contributions towards advancing the science related to adolescents drinking intention, drinking onset, and behaviors. In addition, this chapter discusses the study findings in the relation to nursing practice, health policy, and implications for future research. It is hoped that the nuanced understanding generated from this dissertation will expand existing knowledge about the predictability of rural Thai adolescents' drinking intention on their drinking onset and drinking patterns, as well as the impact of alcohol-related media exposures on adolescents' drinking intention and provide valuable recommendations for researchers and policymakers to address this country's underage drinking problem, especially in rural Thai communities.

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CHAPTER 2: ADOLESCENTS' PERCEIVED DRINKING NORMS TOWARD ALCOHOL MISUSE: AN INTEGRATIVE REVIEW

Abstract

The purpose of this integrative review is to synthesize prior research on the relationship between adolescents' perceived subjective and descriptive drinking norms and their drinking intention and behaviors. Four databases (CINAHL, PubMed, Cochrane, and Sociological Abstracts) were searched to identify relevant articles. Thirty-one peer-reviewed articles published from 2010 to 2020 were reviewed. The results highlight that adolescents' perceived drinking norms derived from their parents and peers, such as approving or disapproving attitudes, significantly influence adolescents' drinking intention and behaviors. Moreover, pro-drinking messages, advertisements, and postings from electronic media (i.e., TV, movies, and the Internet) and online social networks (e.g., Facebook, Instagram, and Twitter) shape adolescents' drinking intention and encourage adolescents to initiate alcohol consumption early and/or escalate their drinking. Thus, future interventions should focus on subjective drinking norms that stem from interpersonal relationships in combination with perceived descriptive drinking norms derived from various media exposure.

Introduction

The purpose of this integrative literature review is to 1) synthesize the existing literature on the sources of adolescents' perceived subjective and descriptive drinking norms; and 2) examine the influences of perceived drinking norms on adolescents' drinking intention and behaviors (drinking onset and patterns). Alcohol is the most commonly misused substance among adolescents in the United States (CDC, 2020a; Esser et al., 2017). Although access to alcoholic beverages is prohibited for adolescents who are younger than 21 years of age in the

U.S., a 2018 nationwide survey indicated that about 30 % of adolescents aged 12 to 20 years drank alcohol in the past 30 days (CDC, 2020c). Furthermore, about 21 % of high school students had already tried alcohol (Johnston et al., 2019), and 12% of high school students had engaged in binge drinking (≥ 4 drinks for females or ≥ 5 drinks for males within a 2-hour period) in the past 30 days (Kann et al., 2018).

The Health Consequence of Underage Drinking

Underage drinking, defined as drinking prior to the legal age, is positively associated with an increased risk of adverse physical, mental, and sexual health problems among adolescents (CDC, 2020a). Compared to those who begin drinking after 21, adolescents who start drinking alcohol before the age of 15 are five times more likely to have health problems derived from alcohol use disorders in adulthood (NIAAA, 2020), 12 times more likely to be unintentionally injured, 10 times more likely to experience aggression and victimizations, and 2 times more likely to have unprotected and unplanned sex (Hingson & Kenkel, 2004). In addition, adolescents aged 15-17 years who engaged in binge drinking had a 13.4 % higher rate of having unwanted pregnancy compared to those who did not (SAMHSA, 2013). These negative health consequences signify the importance of understanding factors associated with adolescents' *alcohol misuse*, which refers to drinking more than a few sips for adolescents, but the defined drinking amount is different for adult males (> 2 drinks/day) and adult females (> 1 drink/day) (CDC, 2020b).

Socioenvironmental Factors Influencing Adolescent Drinking Intention and Behaviors

Adolescents' drinking behaviors are substantially influenced by their social interactions within the environment (Rimal & Real, 2005). Adolescents' perceptions of alcohol use (perceived drinking norms) are developed from seeing how others act, respond to, or behave regarding alcohol misuse and can ultimately influence their drinking intention (Cail & LaBrie,

2010; Nash et al., 2005). Previous literature reviews have found that adolescents' perceived drinking norms play an important role in adolescents' drinking behaviors (Leung et al., 2014; Rossow et al., 2016; Ryan et al., 2010; Smith & Foxcroft, 2009; Visser et al., 2012).

Parent and Peer Influences

Our analysis of subjective norms relies on the Theory of Planned Behavior (TPB), which considers subjective norms as one of three psychosocial determinants found to be major independent antecedents of drinking intention and, subsequently, behavior (Ajzen, 2002, 2011; Rivis & Sheeran, 2003). Using this model, subjective norms refer to adolescents' perceived beliefs regarding their peers' and/or parents' approval or disapproval of alcohol use (Huchting et al., 2008). Adolescents who have strong and close associations with drinking peers are more likely to drink alcohol than those who do not (Teunissen et al., 2016; Zamboanga et al., 2010). In addition, adolescents who frequently interact with drinking peers may have a pro-drinking mindset because of their peers' approving attitude (Pedersen et al., 2017). Existing studies also show that having drinking parents was another important risk factor for adolescents' underage drinking (Cranford et al., 2010). Having a parent drink *regularly* increases the risk of early drinking and heavy drinking episodes (>15 drinks/week) among adolescents (Pape et al., 2015; Vermeulen-Smit et al., 2012). Notably, adolescents' perceived parental approval of alcohol misuse is suggested as contributing to adolescents' adoption of permissive drinking norms (Tucker et al., 2008; Vorst et al., 2009). However, the potential positive and buffering effects of positive parenting on adolescents' drinking intention and behaviors are not clearly understood, especially during the digital era with increased pro-drinking media exposure.

Alcohol-related Media Exposure

One shortcoming of the TPB is its limited consideration of social norms that exist at the

larger societal level, particularly when drinking behavior is often described as a social lubricant. In tandem with studies such as Lapinski and Rimal (2005), it is important to consider how adolescents' alcohol misuse is also related to descriptive norms, or the perception of what most people in society do and expect in regard to drinking. Adolescents live in a media-rich environment that consistently promotes pro-drinking messages, advertisements, and postings embedded in electronic media (TV, movies, or Internet; Dragan & Hardt, 2016) and online social networking sites (Facebook, Instagram, and Twitter; Barry et al., 2018; Nhean et al., 2014). On average, adolescents in the U.S. spend over 7.5 hours a day using online social networks; however, some adolescents spend over 10 hours per day and access more than one social networking platform (Rideout et al., 2020). Westgate and colleagues (2014) demonstrated that high exposure to pro-drinking postings from their virtual peers encouraged adolescents to initiate drinking early. Moreover, results from longitudinal studies showed that middle school students who had greater exposure to pro-drinking advertisements were more likely to drink alcohol than those with less exposure (Anderson et al., 2009; Collins et al., 2017).

To our knowledge, prior reviews have mainly focused on examining the relationship between adolescents' perceived norms and drinking behaviors (Leung et al., 2014; Rossow et al., 2016; Ryan et al., 2010; Smith & Foxcroft, 2009; Visser et al., 2012), but no review has examined how different sources of perceived drinking norms may influence adolescents' intention to drink. Thus, this review aims to update the science about how both subjective and descriptive norms shape adolescents' perception, intention, and behaviors about alcohol use.

Methods

Study Design

This integrative literature review was conducted using a comprehensive and rigorous

method outlined by Whittemore and Knafl (2005). The integrative review allows for both quantitative and qualitative studies to be included in the review in order to extend the generalizability of the results. This review consists of the following five phases: (1) problem identification and defining key concepts, (2) database search with inclusion and exclusion criteria, (3) study evaluation, (4) data extraction, and (5) data analysis and synthesis. In this review, adolescents aged 10 to 19 years of age were identified as the population of interest in accordance with the World Health Organization's definition (2006) of adolescence. However, recognizing significant differences between college and middle- or high-school students' developmental stages, social relationships, and characteristics of drinking behaviors, we excluded studies focusing solely on college students. In addition, prior research indicated that the lowest age of alcohol initiation in European countries and the U.S. is around the age of 11 (de Witte & Mitchell, 2012; Johnston et al., 2012). Thus, to capture a broad aspect of perceived drinking norms that would influence adolescents' drinking intention and behaviors, this age range was chosen. Moreover, potential sources of adolescents' perceived drinking norms (i.e., parents, peers, alcohol-related media exposure) that could contribute to their drinking intention and behaviors were the focus of this review. The outcomes of interest included alcohol drinking intention and drinking behaviors, namely drinking onset and patterns (current drinker [≥1 standard drink in the past 30 days] and/or binge drinking [≥ 4 or 5 drinks/2 hours]).

Search Strategies

The review and reporting protocols were based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement (Moher et al., 2009). In collaboration with a university library database search expert, we searched four health and social science electronic databases, including the Cumulative Index to Nursing and Allied Health

Literature [CINAHL], PubMed, Cochrane, and Sociological Abstracts. We restricted the search to articles published between January 2010 and January 2020 to ensure that the literature being reviewed was contemporary and relevant because the use of electronic media (TV programming, movies, and the Internet) and online social networking (Facebook, Twitter, and Instagram) have rapidly increased in the past decade (Twenge et al., 2019). Keywords such as adolescent or teen, social media or advertisement, perceived norms, drinking norms, parent or friend, and alcohol intention or alcohol drinking were used to identify the potential articles.

Study Selection

A two-stage process was used to select the studies for analysis in this review. First, we (E.K. and T.A.K.) independently screened the titles and abstracts of articles identified from the search strategy based on the eligibility criteria. Studies included were those that: (1) targeted adolescents aged 10-19 years at baseline; (2) were published in the English language; (3) were peer-reviewed; (4) were original research, using any study design; (5) focused on any perceived norms (parents, peers, and/or media exposure); and 6) included study outcomes focusing on adolescents' drinking intention and/or any pattern of drinking behaviors. Second, based on the abstract screening, the full text of each remaining article was retrieved and assessed for eligibility. We (E.K. and T.A.K.) resolved screening conflicts by consensus. Figure 2.1 depicts the flow of this review.

Data Extraction

The first author (E.K.) extracted information on each study's characteristics based on The Consolidated Standards of Reporting Trials (CONSORT) checklist. Specifically, a data extraction table was used to collect information on author(s)/year of publication, study design/country, study population, study aims, type of perceived norms, outcome measurements,

key findings, and quality score. The second author (T.A.K.) then verified the extracted data. The two authors discussed discrepancies until consensus was reached.

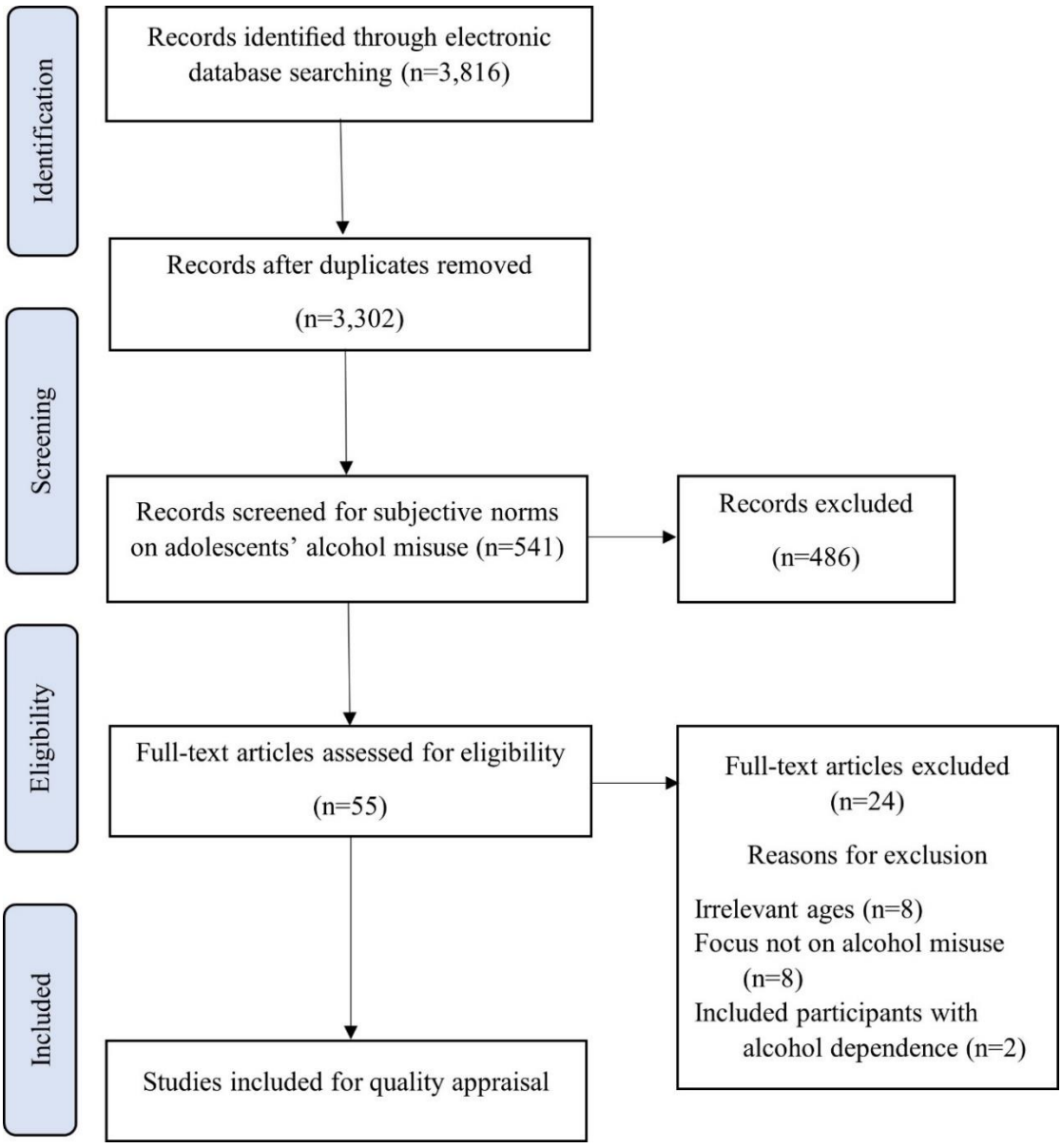
Methodological Quality Assessment

The standard quality-assessment criteria of the Alberta Heritage Foundation of Medical Research (Kmet et al., 2004) was used to appraise the methodological quality of each included study in terms of study design, methodology, and outcome measurement. A total of 10 criteria were used to assess qualitative studies and 14 criteria were used for quantitative studies. Each criterion was scored 2 points (yes), 1 point (partial), 0 point (no), or not applicable (N/A). The quality score of each study was calculated by summing all criteria scores and then dividing by the potential total score. The first and second authors (E.K. and T.A.K.) independently evaluated each included study and then discussed any discrepancies until mutual agreement was reached.

Results

A total of 3,816 articles were identified following our database search. After removing duplicates, 3,302 articles remained. Of the remaining studies, 541 articles focused on exploration of perceived drinking norms and their influence on adolescents' alcohol drinking intention and/or behaviors. Fifty-five were identified as potentially meeting inclusion and exclusion criteria and were obtained for independent reviews by the first and second author. After full text review, 24 additional articles were subsequently excluded for various reasons (e.g., irrelevant ages, no focus on alcohol misuse, participants with alcohol dependence, and not original study). Finally, 31 articles were included in this integrative review. A PRISMA flow diagram of the search process is depicted in Figure 2.1.

Figure 2.1: PRISMA flow diagram of article selection process



Overall Study Characteristics

The sample sizes of the studies in this review ranged from 44 (Friese et al., 2012) to 70,922 (White et al., 2017). The mean age of adolescents was 14.41 years with 51 % being female. Studies were conducted in the U.S. (*n*=13, 42 %); Australia (*n*=5, 16%); multiple countries (*n*=5, 16%); and Taiwan (*n*=2, 6%); one study per country was carried out in Brazil,

the Netherlands, Norway, Germany, Canada, and the United Kingdom. The majority of studies were quantitative (*n*=29, 94%). Only two studies used a qualitative design (6%) exploring the usefulness of parental monitoring on buffering peers' pro-drinking attitudes (Friese et al., 2012; Janssen et al., 2014). Of the 29 quantitative studies, 19 used a cross-sectional design (66%) and 10 (34%) employed a longitudinal study design. Table 2.1 depicts the overall characteristics of the studies included in this review. Studies examined the sources of adolescents' perceived drinking norms including parents (*n*=8, 26%), peers (*n*=8, 26%), and media exposure (*n*=25, 81%). Study outcomes included adolescent drinking intention (*n*=13, 42%), drinking onset (*n*=16, 52%), and drinking patterns (*n*=27, 87%). Among the 25 studies measuring drinking patterns, 22 assessed current drinking behavior (71%) and 16 assessed binge/heavy drinking (52%). Of the 25 studies exploring perceived drinking norms derived from media exposure, 21 (84%) assessed the influences of pro-drinking messages embedded in various electronic media (TV, movies, and Internet), while four (16%) investigated the influence of pro-drinking postings from online social networks (Brunborg et al., 2017; Cavazos et al., 2015; Mundt, 2011; Nesi et al., 2017). Only one study, which was guided by the Social Cognitive Theory, identified virtual peers as a potential source of adolescents' perceived drinking norms (Nesi et al., 2017). None of the studies investigated perceived drinking norms derived from their parents, peers, and media simultaneously. Table 2.2 details the analytical themes of the studies included in this review.

Methodological Quality Score

Table 2.1 illustrates the results of our quality assessment. The quality scores varied from 0.65 to 1.00 on a 0-1 scale (*n*=29) for quantitative studies and 0.81 to 0.90 (*n*=2) for qualitative studies. According to Kmet and colleagues (2004), quality scores above 0.55 are considered good and can be included in the review. In this review, no study was excluded as a result of a

low-quality score. For the qualitative studies, strengths included a clear description of research questions or objectives, appropriate study designs, and rigorous data collection and analysis procedures. The most concerning issues included the lack of clear explanations about the underpinning theoretical framework (*n*=2) and/or potential reflexivity in the study report (*n*=2). For the quantitative studies, strengths included clear descriptions of research questions or objectives (*n*=29, 100%), research designs (*n*=28, 97%), subject selection (*n*=24, 83%), and analytical methods (*n*=22, 76%). The most concerning issues were the lack of clear explanation of the theoretical framework (*n*=8, 28%), adequate power estimation (*n*=6, 21%), and sufficient detail in reported results (*n*=4, 14%).

Factors Related to Adolescents' Drinking Intention and Behaviors

Adolescents' intention to drink was largely correlated with their perceived drinking norms stemming from parents, peers, and pro-drinking media exposure. Among the 13 studies that used drinking intention as an outcome, 12 found significant associations between adolescents' perceived drinking norms and drinking intention with correlation coefficients ranging from 0.23 ($p < .05$, n=68; Aiken et., 2018) to 0.55 ($p < .01$, n=400; Schwinn & Schinke, 2012), while one study did not ($p = .72$, n=762; Russell et al., 2017).

In this review, drinking behavior focused mostly on adolescents' drinking onset (age of initiation) and drinking patterns, including current drinking status (≥ 1 drink/30 days), binge drinking (≥ 4-5 drinks/2 hours), and heavy drinking (> 15 drinks/week). Adolescents' perceived drinking norms derived from peers and pro-drinking media exposure emerged as a persuasive factor for adolescents' earlier drinking onset and binge and heavy drinking. Among 27 studies investigating adolescents' drinking behaviors (as outcome), 21 quantitative studies showed significant negative associations between adolescents' perceived drinking norms and drinking

behaviors/patterns, while four studies (19.05%) found no significant associations. In addition, two qualitative studies verified the significant role of parents' and peers' attitudes on adolescents' current drinking status (Friese et al., 2012; Janssen et al., 2014).

Parental Influence on Adolescent Drinking Intention and Behaviors

Drinking Intention. Parents' own alcohol misuse emerged as a negative role model that increased adolescents' intention to drink, while parental supervision and communication regarding alcohol misuse decreased adolescents' intention to drink. In studies within the U.S., parents' patterns of alcohol misuse were highly associated with adolescents' intention to drink, particularly for high school students (Friese et al., 2012; Randolph et al., 2018; Schwinn & Schinke, 2014). Parental communications regarding the negative consequences of alcohol misuse were noted to minimize adolescents' intention to drink (Friese et al., 2012; Lam et al., 2017). Similarly, Shin and colleuges (2016) found that parental communication was associated with a decreased intention to drink among Mexican-heritage adolescents who had never tried alcohol, whereas parental provision of alcohol as well as availability of alcohol in the home were positively linked to adolescents' intention to drink (Schwinn & Schinke, 2014). Finally, Schwinn and Schinke (2014) reported that parental monitoring and rigorous family rules against alcohol misuse were related to a lower intention to drink (p <.001) and increased parental support.

Drinking Behaviors. Parent drinking patterns appeared to play a modeling role in influencing adolescents' drinking behaviors (onset and patterns). Two studies found that parents' alcohol misuse as well as binge and heavy drinking patterns were significantly associated with adolescents' earlier drinking onset (Friese et al., 2012; Jackson et al., 2018), while Randolph et al. (2018) noted that having a parent who drank alcohol daily increased the risk of early drinking onset (*RR*=1.69; 95% CI=1.41, 2.02) and drinking escalation (*RR*=1.26; 95% CI=1.02, 1.55)

among adolescents. In addition, adolescents who were exposed to drinking parents at age 14 had a higher risk of alcohol escalation (*RR*= 2.17; 95% CI=1.18, 3.99), as compared to those exposed to drinking peers at the same age (*RR*=1.47; 95% CI=0.82, 2.60). Notably, the influence of drinking parents was relatively weaker than the influence of drinking peers among U.S. late adolescents, aged 18-19 years (Schwinn & Schinke, 2014).

In addition to parents' drinking status/patterns, parental attitude, communication, and monitoring buffered adolescents' drinking behaviors. For example, in a study with Australian high school students, adolescents' perceived disapproving attitudes of their parents regarding alcohol misuse was found to be a protective factor against heavy drinking behavior (Lam et al., 2017). Furthermore, parental positive communication with teens about risky drinking was noted to postpone drinking onset and decrease the likelihood of escalating drinking behaviors among adolescents (Cox et al., 2018; Janssen et al., 2014). Two studies found that parents who communicated in a way that made adolescents feel comfortable discussing alcohol misuse could prevent their adolescents from drinking alcohol prematurely (Janssen et al., 2014; Lam et al., 2017). Specifically, parental discussion about the consequences of drinking protected against adolescents' drinking at parties or other social events (Lam et al., 2017).

A study conducted in the U.S. (Cox et al., 2018) found that poor parental monitoring increased adolescents' odds of drinking, as compared to those with better parental monitoring (*OR*=1.29; 95% CI= 1.04, 1.61). Furthermore, in a qualitative study conducted in the U.S., adolescents with loose parental monitoring were linked with more frequent reporting of current drinking status (Friese et al., 2012). Whereas parents' strict rules concerning alcohol misuse emerged as a protective factor against adolescents' current drinking and were significantly associated with a delayed drinking onset (Jackson et al., 2018; Randolph et al., 2018) and

decreased binge drinking (Cox et al., 2018). Oddly, Lam et al. (2017) found that having parents provide the first drink actually reduced Australian adolescents' risks in subsequent drinking, compared to those who got their first drink from another source at peer-based social events. However, this protective effect was not significant for adolescents' drinking behaviors at parties.

Peer Influence on Adolescent Drinking Intention and Behaviors

Drinking Intention. Three studies (Mundt, 2011; Randolph et al., 2018; Schwinn & Schinke, 2014) noted that an increased number of peers using and offering alcohol was positively associated with adolescents' intention to drink ($p < .001$). Peers' alcohol misuse explained about 37 % of the variance in adolescents' intention to drink (Schwinn & Schinke, 2014), while having each additional drinking friend increased their intention to drink by 34% (Mundt, 2011). It is important to note that the exposure to pro-drinking postings through online social networking peers (e.g., Facebook, Instagram, and Twitter) has been suggested as contributing to the development of persuasive descriptive norms that stimulated adolescents' intention to try alcohol (Cavazos et al., 2015; Mundt, 2011; Nesi et al., 2017). In fact, these three studies confirmed that adolescents' viewing of party-related pro-drinking postings from their online social networking peers (Facebook) increased their intention to drink.

Drinking Behaviors. The perception of peer approval of alcohol drinking was found to have a strong influence on adolescents' drinking onset and current use of alcohol. Specifically, the closeness to drinking peers was the most commonly identified factor that advocated adolescents' drinking behaviors (Jackson et al., 2018; Janssen et al., 2014; Nesi et al., 2017; Randolph et al., 2018). For both males and females, having a close relationship with a male drinking peer increased the chance of drinking in the past 30 days (Deutsch et al., 2014). In a U.S. longitudinal study exploring the relationship between the co-evolution of friendship and

adolescents' alcohol drinking behavior, Wang and colleagues (2017) found that adolescents were more likely to select peers who had a similar drinking pattern. This study also noted that adolescents' increased quantity and frequency of drinking were associated with an increased popularity with their peers.

Adolescents' current drinking status (≥1 drink/30 days) is highly associated with the drinking pattern of their drinking peers (Deutsch et al., 2014; Mundt, 2011; Nesi et al., 2017). Peers using and offering alcohol explained about 33 % and 29 % of the variance in adolescents' past-month drinking and binge drinking, respectively (Schwinn & Schinke, 2014). Moreover, each additional drinking peer increased the risk of engaging in current drinking by 13 %; for each additional association with a *regular* drinking peer, the risk increased by 34 % (Mundt, 2011). Nesi and colleagues (2017) examined the role of perceived drinking norms stemming from peers' approving or disapproving attitudes toward alcohol misuse on adolescents' drinking patterns among 658 U.S. high school students. This study found that approved descriptive and subjective norms positively predicted adolescents' past month drinking (p <.01), heavy drinking behavior (p <.001), and episode of becoming drunk over one year (p <.001). Moreover, Randolph and colleagues (2018) reported that having a drinking peer at a younger age (≤ 13 years versus ≥ 17 years) increased adolescents' risks of drinking early and frequently. Although a close relationship with drinking friends was associated with adolescents' current drinking status, it is unclear whether adolescents' relationships with peers of a different sex had a disparate impact on their drinking status (Deutsch et al., 2014).

Media Influence on Adolescent Drinking Intention and Behaviors

Drinking Intention. Of the eight studies examining the contribution of media exposure on adolescents' intention to drink, seven (88%) confirmed such contribution except one (Russell

et al., 2017). The sources of media exposure included pro-drinking messages, advertisements, and postings embedded in electronic media (TVs, movies, and the Internet) and online social networking platforms (Facebook, Instagram, Twitter). A study conducted in Australia (Aiken et al., 2018) reported that exposure to advertisements filled with pro-drinking messages was more pronounced among younger adolescents (ages 16-17 years), as compared to older adolescents (ages 18-19 years), in influencing drinking intention. Interestingly, two studies (de Bruijn et al., 2016; Morgenstern et al., 2011b) noted that increased exposure to pro-drinking messages embedded in electronic media (TV and movies) resulted in earlier intention to drink among never-drinking groups. However, the impacts of pro-drinking messages on adolescents' drinking intention and behaviors differed depending on their sex. For females, drinking intention was highly related to online social networking activities (Morgenstern et al., 2017), while exposure to pro-drinking messages in movies, TV, and the Internet was associated with higher intention to drink among Taiwanese male adolescents who had prior drinking experiences (Chen et al., 2017). Similarly, in a study with 351 Australian adolescents, Aiken et al (2018) found that, compared to males, female adolescents' intention to drink was more likely to be influenced by pro-drinking messages embedded in TV and outdoor billboards (p <.05). Additionally, Mundt (2011) found that adolescents' frequent associations with drinking peers from online social networking sites increased their intention to drink (p <.001).

Drinking Behaviors. Exposure to pro-drinking postings through various online social networks played a role in adolescents' drinking onset and patterns. Adolescents who were more active on online social networks were more likely to drink during parties or social events (Brunborg et al., 2017; Cavazos et al., 2015; Nesi et al., 2017). Exposure to peers' pro-drinking postings on Facebook strongly predicted adolescents' earlier drinking onset (Cavazos et al.,

2015; Mundt, 2011) and heavy drinking episodes over time (Nesi et al., 2017). Similarly, Brunborg and colleagues (2017) found that exposure to peers' party-related pro-drinking postings increased the likelihood of binge drinking (*OR*=1.16; 95% CI=1.11, 1.22). Correspondingly, in a global online survey, the majority of adolescents (79%) who tweeted about wanting or planning to drink alcohol either already self-identified as current drinkers or had consumed alcohol with friends (Cavazos et al., 2015). Finally, Brunborg et al. (2017) estimated that each hour of exposure to pro-drinking pictures/postings on online social networks increased the likelihood of heavy drinking among Norwegian adolescents by 12%.

Exposure to pro-drinking messages or alcohol-related advertisements from various electronic media was identified as a strong predictor of adolescents' drinking onset and patterns. Among all sources of electronic media, TV was the most identified source for pro-drinking messages (Aiken et al., 2018; Chang et al., 2014; Chen et al., 2017; Morgenstern et al., 2011b). In fact, exposure to pro-drinking messages via television viewing increased the likelihood of early drinking onset (*OR*=3.20; 95% CI=1.54–6.63) and consistent drinking (*OR*=2.35; 95% CI=1.22–4.55) among Taiwanese high school students (Chen et al., 2017). Similarly, Morgenstern and colleagues (2017) found that adolescents' exposure to party-related pro-drinking messages on the Internet increased adolescents' odds of earlier drinking onset (*OR*=19.17; 95% CI=3.72-98.79) and binge drinking episodes (*OR*=3.87; 95% CI=1.07-13.99). Bigman and colleagues (2019) found that adolescents who viewed pro-drinking images in movies for around 20 minutes were 32% less likely to drink alcohol, as compared to those who had 93 minutes of exposure. Correspondingly, Waylen and colleagues (2015) indicated that adolescents with high exposure to pro-drinking messages in films (≥ 64 minutes/time) were 1.2 times more likely to initiate drinking early, and 2.4 times more likely to drink compared with

those with less exposure (≤ 27 minutes/time). Faria et al. (2011) found that paying attention to pro-drinking messages embedded in alcohol-related advertisements significantly increased the odds of current drinking among Brazilian adolescents (*OR*=1.56; 95% CI=1.04-2.33). While exposure to pro-drinking messages depicted in a pub or bar was significantly associated with past month drinking behavior among rural adolescents in Australia (Jones & Magee, 2011), such influence might differ by advertising platforms (Chen et al., 2017) and adolescents' age or sex (Jones & Magee, 2011).

Discussion

To our knowledge, this integrative review is the first to use the TPB to systematically analyze the literature examining how adolescents' perceived drinking norms may shape their drinking intention and behaviors (onset and pattens). Considering the growing use of Internet and online social networks, this review is unique in adding media exposure as one potential source of adolescents' perceived drinking norms (i.e., subjective norms from virtual peers and descriptive norms from electronic media exposure). The findings of this current review demonstrate that adolescents' drinking intention and behaviors were highly associated with adolescents' perceived drinking norms derived from their interactions with their parents and peers and exposure to alcohol-related media.

This integrative review provides support to apply TPB in order to understand the contribution of perceived drinking norms on adolescents' drinking intention and behaviors. Among health and social behavior theories, TPB is unique because it pays attention to the psychosocial determinants, particularly subjective norms, that may influence adolescents' intention to drink. Understanding adolescents' drinking intention is critical to prevent adolescents from misusing alcohol because the best prevention effort involves early

identification of the problem before it becomes too late or too difficult to treat. Moreover, to address the recognized limitation of the TPB, this review expanded drinking norms to include descriptive norms derived from media exposures or societal expectation (Cox & Bates, 2011; Lapinski & Rimal, 2005). This inclusion is important because subjective norms alone may not be sufficient to capture drinking norms of adolescents with high media exposure (Cail & LaBrie, 2010; Nash et al., 2005).

Adolescents' drinking intention is positively influenced by the attitudes and drinking status/patterns of their parents and peers. Parents' attitudes and drinking status/patterns appear to serve as both risk and protective factors in adolescents' drinking intention (Friese et al., 2012; Randolph et al., 2018; Schwinn & Schinke, 2014). Parental practices (communication, monitoring, and family rules) regarding alcohol misuse may shape adolescents' attitudes and subjective norms toward drinking (Lam et al., 2017; Randolph et al., 2018; Schwinn & Schinke, 2014), as indicated by the TPB (Ajzen & Fishbein, 2005). Thus, understanding how adolescents perceive drinking norms from their parents would be particularly important for young adolescents (13-15 years old) as parental monitoring is noted to effectively regulate adolescents' drinking intention before the age of 16 (Janssen et al., 2014).

Many of the studies examining the relationship between media exposure and alcohol misuse have mostly focused on the impact of pro-drinking messages (Bigman et al., 2019; Morgenstern et al., 2017; Mundt, 2011; Nesi et al., 2017). The influence of anti-drinking messages remains understudied. This review indicated that newer generations of adolescents may adopt descriptive drinking norms via online social networking activities with their virtual drinking peers. In fact, adolescents' exposure to pro-drinking postings from their virtual peers, especially from Facebook and Twitter, could prompt their intention to drink alcohol early

(Cavazos et al., 2015; Mundt, 2011). Distinct from previous reviews, this finding highlights the significant influences of descriptive norms derived from pro-drinking messages/postings embedded in electronic media exposure and online social networking activities. Adolescents seem to perceive alcohol misuse as acceptive descriptive norms because of socialization with both in-person and online peers and exposure to pro-drinking messages; as a result, they may consume their first drink prior to the legal age (Chen et al., 2017; Nesi et al., 2017; Randolph et al., 2018; Sampasa-Kanyinga & Chaput, 2016).

Regardless of sex, adolescents' drinking onset and patterns were influenced by their close relationships with drinking peers, as well as their perceived acceptive attitudes and drinking norms of their virtual peers (Janssen et al., 2014; Randolph et al., 2018). Modern technology has dramatically changed the way adolescents interact with others and likely reinforces these influences (Twenge et al., 2019). Future studies should aim to understand how different patterns of alcohol-related media exposure may be related to adolescents' drinking intention among drinkers and nondrinkers.

In addition, the quantity and frequency of adolescents' current and binge drinking patterns were highly influenced by their associations with pro-drinking peers and media exposure (Deutsch et al., 2014; Janssen et al., 2014; Schwinn & Schinke, 2014). This is particularly important for adolescents younger than 14 (Crosnoe, 2000; Gobnik et al., 2017) because their cognitive development is not completed, potentially limiting their ability to evaluate the credibility of pro-drinking messages or postings (Hartley & Somerville, 2015). Thus, for school educators, researchers, and health care providers, teaching adolescents how to discern pro-drinking and anti-drinking messages embedded in various electronic media and online social networking activities would be critical. This is congruent with Chang and colleagues' findings

(2016) that adolescents with a high level of media literacy (i.e., having good ability to access, analyze, evaluate, create, and act with media) were less likely to engage in risky drinking behaviors. Therefore, improving adolescents' ability to responsibly discern anti- and pro-drinking messages may be an important component to consider when developing an effective prevention program aimed at curbing underage and binge drinking behaviors. Additionally, there have been recent calls for more understanding of the influence of anti-drinking messages, particularly when anti-drinking messages are frequently promoted by policymakers to offset the negative impact of alcohol misuse. Further information about the effects of anti-drinking messages can help policymakers minimize adolescents' drinking risks.

Our review confirms the role of parents in modeling subjective norms that shape adolescents' attitudes and intention to drink (Neighbors et al., 2009; Prins et al., 2011). Therefore, alcohol prevention programs should implement protective parenting practices (i.e., family rules against alcohol misuse, parental communication regarding drinking consequences, and parental monitoring) to prevent adolescents from early and binge drinking (Cox et al., 2018; Faria et al., 2011; Friese et al., 2012; Janssen et al., 2014). In other words, helping parents utilize positive communication skills, parental monitoring, and family rules could be useful parenting strategies to minimize the negative impacts of pro-drinking messages and undue drinking pressure from deviated peers (Hurley et al., 2019).

The findings of this integrative review are limited by some methodological issues. First, studies varied in terms of how perceived drinking norms (descriptive or subjective) were defined and measured, as well as how alcohol misuse was measured. Second, study sample sizes varied greatly. Third, the majority of studies used cross-sectional observational designs that inhibit the ability to make causal inferences. Additionally, only English language articles were included

with the majority (*n*=13) of them conducted in the U.S.; thus, generalization of findings is limited. Different countries may have different cultures, social norms, and policies regarding alcohol use and advertisements, which may subsequently influence adolescents' descriptive norms toward drinking. Finally, the aim of this review was to examine the literature on three key sources of perceived drinking norms across a range of alcohol drinking behaviors; as such, meta-analysis was not possible. While integrative reviews may not have the same rigor as systematic reviews and meta-analyses, this review was guided by a comprehensive and objective approach (Whittemore & Knafl, 2005).

In conclusion, the results of this review provide valuable insights for future nursing practice. First, this review affirmed three potential sources of perceived drinking norms (parents, peers, and media exposure) and their significant contributions to adolescents' drinking intention and behaviors. This review also confirmed the importance of helping parents develop effective parenting strategies to promote adolescents' understanding about the responsibilities and consequences associated with alcohol misuse. Additional attention should be paid to assist parents in helping their adolescents foster friendships with prosocial behavior peers, discern the meaning of drinking messages embedded in media and assume responsibilities for alcohol use. To minimize deviated peer influences, future prevention programs should aim to equip adolescents with high media literacy. Finally, policies on the availability of pro-drinking messages/postings on social media should be regulated and monitored to prevent premature or prolonged exposures to younger adolescents whose brain and cognitive skills are not yet well-developed.

Table 2.1: Detail of studies included in this review (N=31)

Authors/ year	Design / Country	Population	Study Aims	Source of exposure	Outcome Variable(s)	Key finding	Quality Score
Aiken et al. (2018)	Cross-sectional, Australia	n = 351, age 16-19 years (M = n/a), 51% male	Examine the relationship of alcohol advertising exposure and drinking intention	Media	Drinking intention	Positive perception of alcohol advertisements was associated with increased drinking intention (p<.05)	0.83
Bigman et al. (2019)	Longitudinal, USA	n = 1,154 (M=14), 48.9% male	Examine the relationship between drinking images in movies and drinking initiation	Media	Alcohol initiation	Exposure to drinking images in movies was significantly associated with early drinking initiation (RR=1.53; 95% CI [1.11, 2.10]; p=008).	0.95
Brunborg et al. (2017)	Cross-sectional, Norway	n = 815, grade 8-12 (M = n/a), 46.1% male	Examine the association of social media use and drinking behaviors	Media	Episodic heavy drinking (EHD)	Number of hours of social media use was significantly related to the likelihood of EHD (OR= 1.16; 95% CI (1.11, 1.22), p < .001).	0.88
Cavazos et al. (2015)	Cross-sectional (online), Global	n = 5,000, age 14-19 years (M = n/a)	Examine the relationship between Twitter chatter about drinking and drinking behavior	Media, Online peers	Drinking behavior, drinking intention	79% of Tweets about drinking were related to a positive perception toward drinking. Tweets about intent or plans to drink alcohol were associate with currently behavior/drinking state	0.65

Table 2.1 (cont'd)

Author/ year	Design / Country	Population	Study Aims	Source of exposure	Outcome Variable(s)	Key finding	Quality Score
Chang et al. (2014)	Cross-sectional, Taiwan	n = 2,315, age 15-17 years (M = 15.5), 52% male	Investigate the association between alcohol media exposure and drinking behavior	Media	Drinking initiation, drinking persistence	16.6% of non-drinkers had initiated alcohol after 1-year follow-up. Higher exposure to alcohol media significantly influenced both initiation and drinking persistence.	0.81
Chen et al. (2017)	Cross-sectional, Taiwan	n = 1,926, age 13-14 years, 47.3% male	Examine potential effects of alcohol ads on drinking behaviors	Media	Drinking initiation, occasional drinking	Exposure to alcohol ads on TV was associated with subsequent increased drinking initiation (OR=2.62; 95% CI = 1.14–6.02).	0.90
Cox et al. (2018)	Cross-sectional, USA	n = 1,023 (M = 12.2), 48% male	Explore the influence of parenting practices on adolescents' drinking	Parent	Drinking behavior, EHD	Parental rules, punishment, and communication was associated with lower odds of drinking ($p < .001$). Witnessing parent drinking habits increased the risk of EHD (OR=1.43, 95% CI=1.13,1.81; $p < .01$)	1.00
de Bruijn et al. (2016)	Cross-sectional, Germany, Italy, Netherlands, and Poland	n = 6,652, age 17-19 years (M = 13.9), 53.2% male	Assess the effect of alcohol marketing exposure on drinking behaviors	Media	Drinking intention, past month drinking	Higher exposure to alcohol ads was associated with drinking intentions and past month drinking ($p < .001$).	0.95

Table 2.1 (cont'd)

Authors/ year	Design / Country	Population	Study Aims	Source of exposure	Outcome Variable(s)	Key finding	Quality Score
Deutsch et al. (2014)	Longitudinal, USA	n = 3,702, age 13-17 years (M = 15.8), balanced sex ratio	Examine the effects of peers' influence on adolescents' drinking behavior	Peer	Past year drinking, heavy drinking and drunkenness	Closeness to male peer increased the risk of drinking behavior for both male and female adolescents.	0.92
Faria et al. (2011)	Longitudinal, Brazil	n = 1,115, age 12-13 years, 46.7% male	Investigate the association between alcohol ads and drinking behaviors	Media	Past month drinking behavior	Positive perception of alcohol ads increased the odd of drinking (OR = 2.12; p=.001). Higher attention to alcohol ads increased the odd of drinking (OR = 1.563, p = .028).	0.88
Faulkner et al. (2017)	Cross-sectional, Australia	n = 4,413, age 12-17 years, 48.3% male	Investigate the associations between alcohol ads exposure and drinking behaviors	Media	Past month drinking, risky drinking	Alcohol advertising exposure was significantly associated with adolescents' past month drinking and risky drinking (p < .001)	0.90
Friese et al. (2012)	Qualitative, USA	n = 44, ages 15–18 years (M = 15.1)	Explored parental roles and adolescents' drinking behaviors	Parent	Past month drinking behaviors	Inadequate parental rules were associated with adolescents' drinking without permission. 75% of drinking adolescents are from families with poor monitoring at home.	0.81

Table 2.1 (cont'd)

Authors/ year	Design / Country	Population	Study Aims	Source of exposure	Outcome Variable(s)	Key finding	Quality Score
Grenard et al. (2013)	Cross-sectional, USA	n = 3,890, age 12-15 years, 54% male	Examine the relationship between exposure to alcohol ads and drinking behaviors	Media	Past 30- and 60-days drinking behaviors	There was a long-term effect of exposure to alcohol ads on adolescents' drinking behaviors after three years of follow-up.	0.83
Hanewinkel et al. (2014)	Longitudinal, Germany, Iceland, Italy, Netherlands, Poland, and Scotland	n = 2,346 (M = 12.9), 46.1% male	Investigate the association of exposure to drinking scenes in movies and drinking behaviors	Media	Alcohol initiation, binge drinking initiation, drinking intention	Exposure to each additional 1,000 movies was associated with increased intention (RR=1.05; 95% CI, 1.02–1.08), and binge drinking (RR=1.13; 95% CI, 1.06–1.20)	1.00
Jackson et al. (2018)	Cross-sectional, USA	n = 882, age 10-15 years (M = 12.2), 48% male	Examine the influence of alcohol content in movies on drinking onset	Media, peer, parent	Drinking initiation, drinking behavior, and EHD	Hours of exposure was significantly associated with all 3outcomes. Friend-shared exposure increased risk of EHD (RR = 1.04; 95% CI, 1.02-1.07)	0.95
Jones & Magee (2011)	Cross-sectional, Australia	n = 1,113, age 12–17 years (M = 14.4), 40.1% male	Examine the association between alcohol advertisement exposure and drinking behaviors	Media	Past month drinking, past year drinking	Alcohol advertisement exposure significantly increased the odds of early initiation (OR = 1.69; 95% CI 1.27–2.25)	0.92

Table 2.1 (cont'd)

Authors/ year	Design / Country	Population	Study Aims	Source of exposure	Outcome Variable(s)	Key finding	Quality Score
Janssen et al. (2014)	Qualitative, Netherlands	n = 55, age 12-17 years	Explore the role of parents and peers in adolescents' drinking and attitudes towards alcohol	Peer, parent	Current drinking	Peer pressure played a role in adolescents' early initiation and drinking behavior. Parental strict rules played an important role in deterring adolescents' drinking	0.90
Lam et al. (2017)	Cross-sectional, Australia	n = 946, aged 17–18 years, 42.5% male	Examine parental influences on adolescents' drinking behaviors	Parent	Past month drinking	Parental supply was related with lower drinking (p = .03). Perceived parental disapproval of drinking deterred the risk of drinking.	0.83
Meerkerk & Straaten (2019)	Longitudinal, Netherland	n = 942, age 11-15 years (M = 13.2), 46% male	Investigate the relationship between alcohol advertisement exposure and binge drinking initiation	Media	Past month drinking, binge drinking initiation	Higher exposure groups more often initiated drinking than those who exposed less (34.6% vs 24.1%; x^2 =10.14; p=.001)	0.88
Mejia et al. (2016)	Cross-sectional, Mexico and Argentina	n = 13,295, age 12-14 years (M = 12.5), 51.9% male	Examine the relationship between exposure to alcohol use in films and drinking behavior	Media	Past month drinking, binge drinking	Higher exposure statistically increased past month drinking (OR=1.99, 95% CI 1.73-2.30) and binge drinking (OR=1.68, 95% CI 1.39-2.02)	0.79

Table 2.1 (cont'd)

Authors/ year	Design / Country	Population	Study Aims	Source of exposure	Outcome Variable(s)	Key finding	Quality Score
Morgen-stern et al. (2011)	Cross-sectional, Germany	n = 3,415, age 10-17 years (M = 12.5), 48.4% male	Examine the effects of alcohol advertisement exposure and drinking behaviors	Media	Drinking initiation, past month drinking, binge drinking,	Those exposed to alcohol ads were 2.4 times more likely to initiated drinking, 2.7 and 2.3 times to engage past month drinking and binge drinking respectively	1.00
Morgen-stern et al. (2017)	Longitudinal, USA	n = 1,741 (M = 17.1), 44.2% male	Examine the association between party-related alcohol advertisements and drinking behaviors	Media	Drinking onset, binge drinking onset	Exposure to party-related alcohol ads significantly predicted drinking onset (OR=19.17; 95% CI =3.72, 98.79) and binge drinking onset (OR=3.87; 95% CI=1.07, 13.99)	0.95
Mundt (2011)	Longitudinal, USA	n = 2,610, age 12-19 years (M =15), 48.8% male	Examine the association between social networks and drinking initiation	Peer Media (online)	Drinking initiation	Each additional friend with higher drinking increased the risk of drinking initiation by 13% (95% CI, 4%–22%)	0.88
Nesi et al. (2017)	Longitudinal, USA	n = 658 (M = 16.8), 59% male	Investigate the associations between exposure to social media and drinking behaviors	Peer (online)	Drinking initiation, past month drinking, EHD	Exposure to friends' posts about drinking was strongly associated with early drinking initiation and EHD (p<.01).	0.90

Table 2.1 (cont'd)

Authors/ year	Design / Country	Population	Study Aims	Source of exposure	Outcome Variable(s)	Key finding	Quality Score
Randolph et al. (2018)	Longitudinal, USA	n = 9,348 (M = 15.6), 47% male	Examine the relationship between exposure to parent/peer drinking and drinking behaviors	Peer, parent	Drinking initiation, intention	Parent drinking translated to a higher risk of drinking initiation. Exposure to friend drinking increased the level of early drinking intention, particularly for age ranges ≤13 and ≥17.	0.95
Russell et al. (2017)	Cross-sectional (online), USA	n = 762, aged 14-17 years, 50.1% male	Assessed the relationship between alcohol ads on television and drinking intention	Media	Drinking intention	No significant difference between the influence of pro- and anti-drinking messages on adolescents' drinking intentions.	0.90
Sampasa-Kanyinga & Chaput (2016)	Cross-sectional, Canada	n = 10,072, age 11-20 years (M = 15.2), 51.6% male	Examine the association between the use of social media and drinking behaviors	Media	Past month drinking, past year drinking, binge drinking	Those who use social media for > 2 hours a day were more likely to drink alcohol in the past year than those who do not (Males 23.9 vs 5.5%: Females 23.2% vs 2.5%).	0.82
Schwinn & Schinke (2014)	Cross-sectional, USA	n = 400, age 15-19 years (M = 17.3), 46% male	Examine the influence of peers and parents on adolescents' alcohol drinking	Peer, parent	Drinking intention, past month drinking	Peer influences accounted for 37% of variance in drinking intention and 33% in past month. Parental rules against alcohol decreased drinking intentions ($p < .01$)	0.90

Table 2.1 (cont'd)

Authors/ year	Design / Country	Population	Study Aims	Source of exposure	Outcome Variable(s)	Key finding	Quality Score
Wang et al. (2017)	Longitudinal, USA	n = 1,284, age 12-17 years	Examine the co-evolution of friendship choices and drinking behavior	Peer, parent	Past year drinking	More drinking experiences at home were more likely to increase drinking frequency (p <.001). Having more drinking peers increased the frequency of drinking.	0.92
Waylen et al. (2015)	Cross-sectional, UK	n = 5,163 (M = 15.5), 46.8% male	Investigate the relationship between drinking exposure in films and drinking behaviors	Media	Drinking initiation, binge drinking	Higher exposure to films featuring drinking increased the risk of drinking initiation (1.2 times), binge drinking (1.8 times), and alcohol-related problems (1.7 times).	0.91
White et al. (2017)	Cross-sectional, Australia	n = 70,922, age 12-17 years (M = 14.3), balance sex	Examine the association between television alcohol ads and drinking behaviors	Media	Past month drinking, and risky drinking	Exposure to alcohol ads increased the odds of past month drinking (OR= 1.11, 95% CI = 1.07–1.15) and past week risky drinking (OR=1.15, 95% CI = 1.09–1.22).	0.95

Table 2.2: The analytical themes of included studies (N=31)

Sources of perceived drinking norms	Outcomes			
	Drinking intention (n=13)	Drinking onset (age) (n=16)	Drinking patterns (n=27)	
			Current drinking (n=22)	Binge drinking (n=16)
Parents (n=8)	*Friese, 2012*[Δ]; Lam, 2017; Randolph, 2018[Δ]; Schwinn, 2014[Δ]	*Friese, 2012*[Δ]; Jackson, 2018[Δ]; *Janssen, 2014*; Randolph, 2018[Δ]	Cox, 2018; *Friese, 2012*[Δ]; Jackson, 2018[Δ]; *Janssen, 2014*; Lam, 2017; Wang, 2017	Cox, 2018; *Friese, 2012*[Δ]; Jackson, 2018[Δ]
Peers (n=9)	Cavazos, 2015[Δ]; Mundt, 2011; Nesi, 2017; Randolph, 2018[Δ]; Schwinn, 2014[Δ]	Jackson, 2018[Δ]; *Janssen, 2014*; Mundt, 2011; Nesi, 2017; Randolph, 2018[Δ]	Cavazos, 2015[Δ]; Jackson, 2018[Δ]; *Janssen, 2014*; Nesi, 2017	Deutsch, 2014; Jackson, 2018[Δ]; Nesi, 2017
Media (n=25)				
Pro-drinking postings via online social network (n=4)	Mundt, 2011	Cavazos, 2015[Δ]; Mundt, 2011	Cavazos, 2015[Δ]; Nesi, 2017	Brunborg, 2017; Nesi, 2017
Pro-drinking messages or Ads via electronic media (n=21)	Aiken, 2018; Chen, 2017; de Bruijn, 2016[Δ]; Hanewinkel, 2014[Δ]; Morgenstern, 2011; Randolph, 2018[Δ]; Russell, 2017	Bigman, 2019; Chang, 2014; Chen, 2017; Hanewinkel, 2014[Δ]; Jackson, 2018[Δ]; Jones, 2011; Meerkerk, 2019; Morgenstern, 2011;	Chang, 2014; Chen, 2017; de Bruijn, 2016[Δ]; Faria, 2011; Faulkner, 2017; Grenard, 2013; Jackson, 2018[Δ]; Jones, 2011; Meerkerk, 2019; Mejia, 2016; Morgenstern, 2011; Sampasa-Kanyinga, 2016; White, 2017	Brunborg, 2017; Faulkner, 2017; Hanewinkel, 2014[Δ]; Jackson, 2018Δ; Meerkerk, 2019; Mejia, 2016; Morgenstern, 2011; Morgenstern, 2017; Sampasa-Kanyinga, 2016; Waylen, 2015; White, 2017

Note: Articles are identified by the first author and year. The author's name in italic represents a qualitative study. The symbol [Δ] represented articles with both drinking intention and behaviors outcomes.

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APPENDIX A: SEARCH STRATEGY AND RESULTS

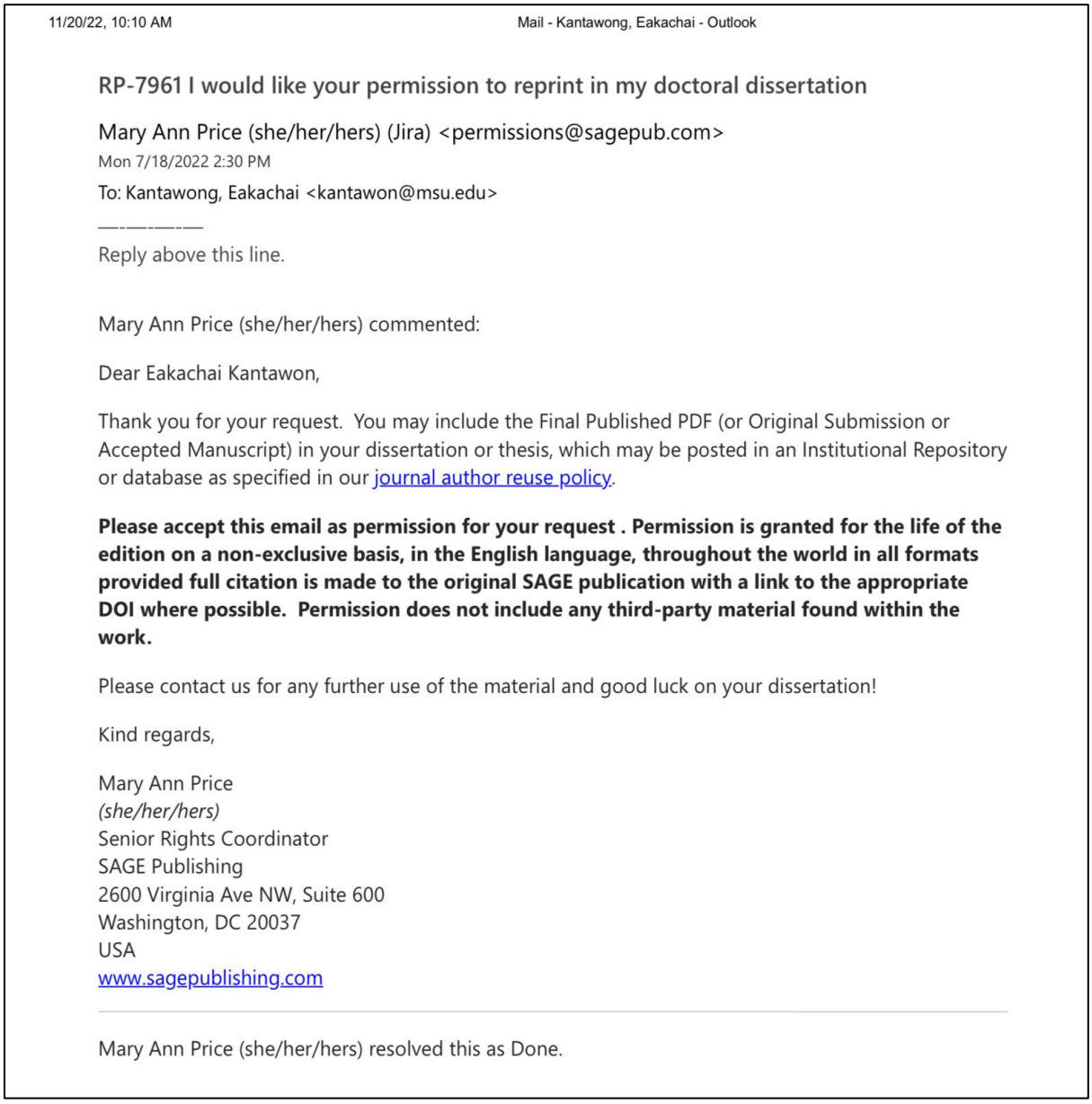
Supplemental Table 2.1: Search strategy and results

Category/Area	**Search Terms**
Population	adolescen* or teen* or youth or students or “high school” or “secondary school” or juvenile*
Predictor	“social media” or facebook or twitter or “media portrayal” or marketing or advertise* or television or website or internet or film or movie or magazine or newspapers or poster or “subjective norm*” or parent* or peer* or friend*
Outcomes	“intention” or “alcohol drinking” or “alcohol consumption” or “drinking behavior” or drinking or alcohol or wine or beer or liquor

Database Search	**Number of Articles Found**
CINAHL	1,173
PubMed	1,154
Cochrane	154
Sociological Abstracts	1,335

APPENDIX B: PERMISSION FOR REPRINT

Supplemental Figure 2.1: Permission for reprint on dissertation



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CHAPTER 3: THE ROLE OF PSYCHOSOCIAL FACTORS AND BIOLOGICAL SEX ON RURAL THAI ADOLESCENTS' DRINKING INTENTION AND BEHAVIORS: A STRUCTURAL EQUATION MODELING APPROACH

Abstract

Purpose: This study examined the contributions of psychosocial factors (i.e., attitude toward drinking, perceived drinking norms [PDNs], perceived behavioral control [PBC]), and biological sex on drinking intention and behaviors among rural Thai adolescents.

Methods: For this cross-sectional study, 474 rural Thai adolescents (M_{age} = 14.54; *SD* = 0.92; 50.6% male) were randomly selected to complete a self-administered questionnaire. Structural equation modeling with the weighted least square mean and variance adjusted was employed for data analysis.

Results: All adolescents' psychosocial factors contributed significantly (β_{range} = 0.16-0.52, p <.01) to the prediction of drinking intention (R^2 = 0.84), which subsequently influenced their drinking onset (β = -0.31, p <.001, R^2 =0.37), current drinking (β = 0.32, p <.01; R^2 =0.18), and binge drinking pattern (β = 0.22, p <.05; R^2 = 0.10) in the past 30 days. PDNs emerged as the strongest psychosocial predictor of drinking intention (β = 0.523, p <.001), followed by PBC (β = 0.330, p <.001). Rural adolescents' drinking intention significantly mediated the relationship between all psychosocial factors and drinking behaviors either fully or partially. The path-coefficient between drinking attitude to drinking intention was significantly different between males and females (ΔX^2= 3.554, p=0.046).

Discussion: Different from previous focus on adolescents' drinking attitude, rural Thai adolescents' PDNs play a significant role on their drinking intention and subsequently their drinking onset and patterns. This nuanced understanding supports a paradigm shift to target

adolescents' perceived drinking norms as a means to delay their drinking onset and problematic drinking behaviors.

Implications and Contribution

Higher levels of perceived drinking norms significantly led to the increase in drinking intention among adolescents. Minimizing adolescents' perceptions of favorable drinking norms and promoting their capacity to resist drinking, especially due to peer pressure, are recommended as essential components of health education campaigns and future efforts to prevent underage drinking.

Introduction

Early onset of drinking alcoholic beverages during adolescence has become an international public health concern (Centers for Disease Control and Prevention [CDC], 2022). Early drinking onset is problematic and contributes to numerous long-term health consequences, including alcohol-related chronic diseases, accident-related disability (Hagström et al., 2018; CDC, 2022), and neurocognitive impairments (CDC, 2022; Lees et al., 2020; National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2022). Most importantly, adolescents who start drinking before age 15 are four times more likely to become alcoholics in adulthood (NIAAA, 2022). A 2018 national school health survey estimated that about 34% of Thai adolescents (ages 13-18 years) had consumed an alcoholic beverage at least once (Assanangkornchai et al., 2018). In fact, the mean drinking age of onset for Thai adolescents was 13.5 years (Paileeklee et al., 2016), and it was one to two years earlier for rural adolescents (Luecha et al., 2019). Moreover, the percentage of Thai adolescents between the ages of 15 and 18 years who consumed alcoholic beverages was greater among rural Thai adolescents than urban Thai adolescents, 34.6% vs. 32.2%, respectively (Tanaree & Vichitkunakorn, 2019). Unfortunately, reasons underlying this

serious problem among rural Thai adolescents continue to remain elusive.

Research shows that drinking behaviors among adolescents in general are highly influenced by various psychosocial factors (Cooke et al., 2016; McEachan et al., 2011). According to the Theory of Planned Behavior (TPB), adolescents are assumed to be rational beings; their drinking intention reflects their conscious plan to engage in drinking behaviors (Ajzen, 2011; Hagger, 2019). Psychosocial factors such as adolescents' attitude toward drinking (perceived beliefs about drinking), subjective norms (perceived beliefs regarding their peers' and/or parents' approval or disapproval toward drinking), and perceived behavioral control (perceived beliefs in exercising volitional control over alcohol use [PBC]), are related to underage drinking problems (Ajzen, 2011; Phuphaibul et al., 2011). The most recent meta-analysis including TPB-based studies showed that adolescents' drinking attitudes was the strongest predictor of drinking intention, followed by subjective norms and PBC (Cooke et al., 2016). Furthermore, drinking intention was moderately correlated with actual drinking behaviors. Similarly, in the case of urban Thai adolescents, psychosocial factors emerged as significant predictors and explained 39.2% of the variance in drinking intention (Phuphaibul et al., 2011). Importantly, adolescents with high levels of drinking intention were 1.79 times more likely to begin drinking early (drinking before the age of 18) than those with lower levels of intention (Fisher et al., 2007). Moreover, adolescent males have an earlier age of drinking onset than females (Cooke et al., 2016; Kyrrestad et al., 2020; Lac at al., 2013). According to a meta-analysis conducted with 40 international studies (Cooke et al., 2016), the magnitude of psychosocial influences on adolescents' drinking intention was also different between males and females.

One shortcoming of the TPB is its limited consideration of the individual's perceived drinking norms at the larger societal level (Armitage & Conner, 2001; Cox & Bates, 2011),

particularly when drinking norms can be developed through social interactions with other environmental sources (Kantawong et al., 2021; Litt & Stock, 2011). More specifically, in rural Thai culture, alcoholic beverage consumption among young adolescents is considered to be a fashionable and pleasurable activity, as well as a means of promoting social relationships (Glomjai, 2015; Kaewpramkusol et al., 2019). As a result, rural Thai adolescents tend to perceive alcohol use as a routine part of life and subsequently engage in drinking behaviors (Ursin, 2016). Thus, *subjective norms* from parents and peers alone may not be enough to capture all aspects of perceived drinking norms associated with rural Thai adolescents' alcoholic beverage use (Cox & Bates, 2011; Lapinski & Rimal, 2005). It is necessary to add descriptive (perceptions of what most people in society do regarding drinking) and injunctive norms (perceptions of how society members at large morally expect individuals to behave regarding drinking) to better reflect rural Thai adolescents' perceived drinking norms (MacArthur et al., 2020; Rimal & Lapinski, 2015; Rivis & Sheeran, 2003).

Currently, the influences of TPB's psychosocial factors have been confirmed to significantly predict adolescents' drinking intention and behaviors across Western countries (Cooke et al., 2016; McEachan et al., 2011; Zhao et al., 2020) and particularly for urban Thai adolescents (Phuphaibul et al., 2011; Piyapan et al., 2016). It is uncertain, however, if the underlying mechanism remains similar for rural Thai adolescents. It is also unclear if the magnitude of associations among these TPB constructs varies by biological sex. Thus, to develop effective strategies to delay onset of rural Thai adolescents' drinking, the first step is to gain a thorough understanding of the psychosocial factors and biological sex influences on rural Thai adolescents' drinking intention and behaviors. Therefore, the purpose of this study includes 2-fold: 1) examining the influences of psychosocial factors of the TPB (i.e., drinking attitude, PDNs, PBC)

on drinking intention and behaviors (current and binge drinking patterns), and 2) investigating biological sex differences in the relationships between psychosocial factors and adolescents' drinking intention and behaviors.

Methods

Participants

For this cross-sectional study, a multi-stage random sample of 474 adolescents (7th–9th graders) was recruited from 8 of 12 eligible public district schools across the Chiang Mai Province, Thailand. Most participating students (87%) are underserved because they are from families whose income is below the urban monthly household income (approximately $850 USD). Our sample size was estimated using the A-Priori Sample Size for structural equation modeling (SEM) software (Cohen, 1988; Soper, 2022). With two latent variables and 10 observed variables (α = .05, effect size = .25, 90% power), the minimum required sample size was 182. The selected effect size of 0.25 is based on the effect sizes (Cohen's d = 0.32–0.44) noted in a previously conducted study examining psychosocial factors of the TPB and drinking intention with urban Thai adolescents (Phuphaibul et al., 2011). As we compared two biological sex models, the sample size was doubled to 364 to ensure adequate power for conducting comparison structural model. We also oversampled by 30% (n= 473) to allow for model expansion in case we needed to account for significant covariates. Among 495 students who met our inclusion criteria including: 1) currently enrolled in grades 7-9; 2) able to understand and speak Thai; 3) permitted by one of their parents to participate; and 4) willing to participate and answer the survey questions at their convenience time at school, a total of 485 students returned their questionnaires. However, 11 cases (2.27%) with excessive missing values and the key outcomes variables (reporting drinking status, onset, and patterns) were subsequently removed

from our final analysis, which included 474 adolescents.

Procedures

Prior to recruitment, the Michigan State University Institutional Review Board (STUDY00006056) and the Secondary Educational Service Area Office 34 (SESAO 34) approved the study. To elicit students' interest, the first author and trained research assistant first contacted school health teachers and met with students to explain the purpose of the study and procedures. Interested students were asked to provide their contact information to the researcher or the school health teacher. Researcher then randomly selected 60 interested students from each school (20 students/grade: 10 males and 10 females) to receive the recruitment package. Selected students were encouraged to discuss the study with their parents and to obtain parental consent prior to providing their assent. A total of 485 students completed the paper-and-pencil survey at a time convenient for them, preferably at the school. Students could either return the completed survey via mail or in the envelope provided to a designated locked box in their schools.

Measures

Sociodemographic and Parental Factors. A 16-item Thai version demographic survey was adapted from a National School Health Survey (Phuphaibul et al., 2011) and used to assess adolescents' sociodemographic characteristics. A 5-item parental survey was employed to collect parents' sociodemographic information (i.e., marital status, education level, monthly household income, drinking status). This parental survey was attached with the parent consent form and completed by parents.

Attitude Toward Drinking. A validated 5-item Thai version of Adolescents' Alcohol Drinking Perception Questionnaire (Ho et al., 2014) was used to assess adolescents' perception regarding drinking alcoholic beverages. It was scored on a 5-point bipolar adjective scale that

included the following items: “Immature–Grown up,” “Not good-looking–Good-looking,” “Boring-Exciting,” “Not cool–Cool,” and “Not popular–Popular”. A higher sum score represents a more favorable attitude toward drinking alcoholic beverages. The internal consistency of this study (α = 0.88) was higher than the original Thai version (α = 0.80).

Perceived Drinking Norms (PDNs). Three different aspects of adolescents’ perceived drinking norms, including perceived *descriptive, subjective*, and *injunctiv*e *norms,* were assessed using the validated Thai Version Questionnaire. The original Cronbach’s alphas were acceptable at 0.72, 0.77, and 0.84, respectively (Ho et al., 2014). Each question asked adolescents to rate their perception using a 5-point Likert scale ranging from 1 (not acceptable at all/very unlikely) to 5 (very acceptable/very likely). A higher sum score reflects a higher level of adolescents’ perceived drinking norms in alcoholic beverage use. Descriptive Norms were measured using a 4-item scale to assess adolescents’ perception about the number of their close friends (or people around their age) who drank alcoholic beverages. A sample descriptive norms question was, “How many of your close friend(s) drink alcohol?” Subjective Norms were assessed using a 5-item scale to assess the degree to which adolescents perceived drinking as being approved or disapproved by significant people. An example of an item was, “Do you think most people who are important to you would approve of you drinking?” Injunctive Norms assessed adolescents’ perception of how acceptable adolescent alcoholic beverage drinking is in Thai society using a 5-item scale. An example of an item was, “Do you think adolescent drinking is acceptable in Thai society?” In this current study, the internal consistency of these subscales was similar to the original ones (α = 0.71–0.86).

Perceived Behavioral Control (PBC). Adolescents’ PBC was assessed through control belief strength and control belief power subscales using the Thai version Questionnaire

(Phuphaibul et al., 2011). The Control Belief Strength 7-item subscale assessed how easy or difficult it is for adolescents to exert control over their drinking behavior using a 5-point Likert scale ranging from 1 (much more difficult) to 5 (much easier). An example of an item was, "I will not drink alcohol even if my parents allow me or provide alcohol for me." The Control Belief Power 7-item subscale assessed how well adolescents are performing in relation to their ability to exercise control over their drinking behavior through a 5-point Likert scale ranging from 1 (most unlikely) to 5 (most likely). A higher sum score of both subscales reflects a higher level of belief they have control over their drinking behavior. Cronbach's alphas for both subscales in this study were acceptable at 0.92 and 0.91, which was slightly lower than the original Thai scale (0.94 and 0.96, respectively [Phuphaibul et al., 2011]).

Drinking Intention. A 5-item measure scored on a 5-point Likert scale (1 = definitely no, 5 = definitely yes) was used to access adolescents' motivation or conscious plan to engage in actual drinking behaviors in the future (α = 0.91 [Ho et al., 2014]). Adolescents were asked to rate how likely they intended to drink alcohol over four time periods (i.e., next month, next year, next five years, and in the long future). The last question asked adolescents to answer how much alcohol they would drink if one of their best friends offered alcoholic beverages to them. A high sum score reflects a high level of drinking intention. The Cronbach's alpha in this study was acceptable at 0.89.

Drinking Behaviors. Adolescents' drinking onset, current drinking, and binge drinking pattern, were assessed with four questions adapted from the Youth Risk Behavior Survey (YRBS) for middle school students (CDC, 2022). Drinking onset was assessed through two sequential questions. Participants were first asked, "Have you ever had a drink of alcohol, other than a few sips?" For participants who answered "yes," they then were asked, "How old were

you when you had your first drink of alcohol?" Current drinking pattern was assessed through the question "How many days did you have at least one standard drink of alcohol in total within the past 30-day?" Binge drinking pattern was assessed by a question "How many days did you engage in binge drinking (≥4 standard drinks for female, or ≥5 standard drinks for male) within the past 30-day?

Statistical Analysis

Descriptive statistics were generated using the Statistical Package for Social Sciences (SPSS 26) software. Pearson's chi-square tests were performed to examine the relationships between the nine sociodemographic factors (i.e., sex, grade level, age, GPA, religion, parental marital status, parental educational level, household income, and parent drinking status) and adolescent premature drinking status (drinker or non-drinker). Initially, the Kolmogorov–Smirnov test results demonstrated that some research variables (drinking attitude, drinking onset, and binge drinking pattern) were not normally distributed. However, their absolute skewness and kurtosis values did not exceed 2 and 7, respectively, implying that the data was not severely skewed and kurtotic (Kline, 2005; Kim, 2013). Only 0.16 % of the data were missing, and its pattern appeared to be missing at random (χ^2 = 550.440, df = 550, p = 0.49) according to the Little's Missing Completely at Random Test (MCAR) embedded in SPSS. Multiple imputations (10 datasets) were conducted using Mplus version 8.6 to obtain the missing values for missing cases within each variable to enhance the robustness (Jakobsen et al., 2017). In addition, internal consistency (Cronbach's alpha) of each measure was examined using SPSS.

Structural equation modeling with the weighted least square mean and variance adjusted (WLSMV) was employed using Mplus version 8.6 (Muthén & Muthén, 2017) to protect against the potential violation of multivariate normality and ordinal indicator (Likert-type scales) issues

(Li, 2016). A range of recommended global fit/misfit indices was used to evaluate a good fit of the measurement and structural models including χ^2/df ratio ≤3 (Hair et al., 2010; Kline, 2005), comparative fit index (CFI) and Tucker-Lewis index (TLI) ≥ 0.95 (Hair et al., 2010; Hu & Bentler, 1999), and the root mean square error of approximation (RMSEA) <0.05 (Chen et al., 2008; Hu & Bentler, 1999). After establishing the measurement model through confirmatory factor analysis (CFA), a full structural model was implemented to illustrate relationships between exogenous and endogenous variables (standardizes coefficients). There were no needs for any model modifications because of excellent fit indices found at the first attempt. Mediation analysis was determined by conducting the 95% bias-corrected confidence interval using 5000 bootstrap samples (Hayes & Scharkow, 2013). Subgroup comparison analysis was performed to compare the path coefficients between males and females using the DIFFTEST procedure embedded in Mplus. At first, all pathways in our base structural model were constrained to be equal between male and female groups. Then, the pathways were released one at a time to evaluate if the path coefficient varied significantly between subgroups by assessing the significant change in chi-square ($\Delta\chi^2$, $p < 0.05$).

Results

Participants Characteristics

This cross-sectional study included 474 students whose ages ranged from 12.17 to 17.58 years (M =14.54, SD = 0.92); 50.63% were males (n = 240). Over half of these adolescents (55.49%, n = 263) disclosed they had drunk alcoholic beverages at least once in their lifetime. The mean age of drinking onset was 12.35 years (SD = 1.80), ranged from 6 to 16 years (see demographics in Table 3.1). The prevalence of alcoholic beverage drinking among those 263 drinkers is illustrated in Appendix A. From the univariate analysis, adolescent age (χ^2 = 6.82, p

<.05), grade level (χ^2 =9.27, p<.05), parent educational level (χ^2 = 10.80, p <.05) and parent alcoholic beverage drinking status (χ^2 = 35.00, p <.001) were significantly associated with adolescents' drinking status (drinker or non-drinker).

Table 3.1: Comparison of adolescent sociodemographic characteristics by premature drinking status (n = 474)

Demographic characteristics	**Total n (%)**	**Drinking status**		χ^2 ***(P-value)***
		Yes n (%)	**No n (%)**	
Total	474(100.00)	263(55.49)	211(44.51)	
Sex				
Male	240(50.63)	132(50.19)	108(51.18)	0.05
Female	234(49.37)	131(49.81)	103(48.82)	(.830)
Grade				
7th grade	156(32.91)	83(31.56)	73(34.60)	9.27*
8th grade	161(33.97)	78(29.66)	83(39.34)	(.010)
9th grade	157(33.12)	102(38.78)	55(26.06)	
Age category (Mean ± SD 14.54 ± 0.92)				
≤13 years	138(29.11)	67(25.47)	71(33.65)	6.82*
14 years	161(33.97)	86(32.70)	75(35.55)	(.033)
≥15 years	175(36.92)	110(41.83)	65(30.80)	
Grade point average (GPA)				
Good (3.50-4.00)	187(39.45)	97(36.88)	90(42.65)	2.69
Fair (2.50-3.49)	214(45.15)	120(45.63)	94(44.55)	(.260)
Low (<2.50)	73(15.40)	46(17.49)	27(12.80)	
Religion				
Buddhism	416 (87.76)	233(88.59)	183(86.73)	3.09
Christianity	50(10.55)	26(9.89)	24(11.37)	(.378)
Islam	2(0.42)	2(0.76)	0(0.00)	
No religion	6(1.27)	2(0.76)	4(1.90)	

Table 3.1 (cont'd)

Demographic characteristics	Total n (%)	Drinking status		X^2 (P-value)
		Yes n (%)	No n (%)	
Parent marital status				
Married	332(70.04)	186(70.72)	146(69.19)	3.51
Widowed	22(4.64)	8(3.04)	14(6.64)	(.320)
Divorced	83(17.51)	48(18.25)	35(16.59)	
Separated	37(7.81)	21(7.99)	16(7.58)	
Parent education				
Less than high school	266(56.12)	152(57.80)	114(54.03)	10.80*
High school	120(25.32)	72(27.38)	48(22.75)	(.029)
Diploma	37(7.80)	20(7.60)	17(8.06)	
≥Bachelor's degree	51(10.76)	19(7.22)	32(15.16)	
Monthly household income				
<10,000 THB	246(51.90)	130(49.43)	116(54.98)	5.07
10,000–29,999 THB	166(35.02)	101(38.40)	65(30.80)	(.167)
30,000–49,999 THB	49(10.34)	23(8.75)	26(12.32)	
≥50,000 THB	13(2.74)	9(3.42)	4(1.90)	
Parent alcohol drinking				
Yes	202(42.62)	141(53.61)	61(28.91)	35.00**
No	272(57.38)	122(46.39)	150(71.09)	(.000)

Note: * = p <.05, ** = p <.001

Test of Measurement Model

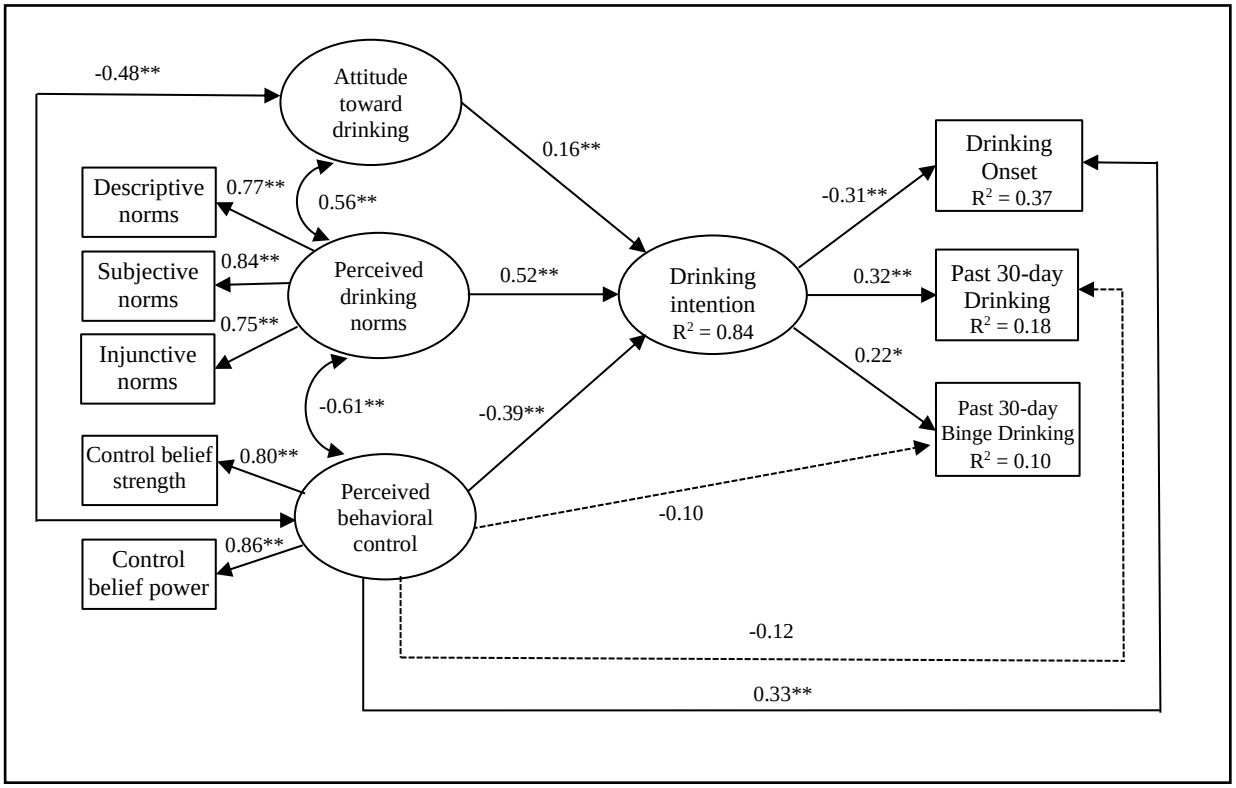
The results from CFA demonstrated a good fit of the measurement model to the data (χ^2/df = 1.980, RMSEA = 0.045, CFI = 0.973, TLI = 0.969). All indicator factor loadings were statistically significant (p <.001). The factor loadings for most indicators were greater than the recommended threshold of 0.60 (Kline, 2005), ranging from 0.61 to 0.93. However, an item

(DN4) in descriptive norms with a factor loading of 0.54 was remained because its loading was above the acceptable level of 0.50 and there were other items within the construct with better factor loadings (Hair et al., 2011). In addition, Cronbach's alphas for all measures ranged from 0.71 to 0.92, exceeding the recommended 0.70 (Cronbach, 1951). The composite reliability for each construct (ranging from 0.78 to 0.85) also exceeded the acceptable level of 0.60, demonstrating good internal consistency (Hair et al., 2010; Fornell & Larcker, 1981). The average variance extracted reported in Appendix B reflected good convergent validity for selected variables.

The Psychosocial Influences on Adolescents' Drinking Intention and Behaviors

The structural model had an excellent fit with the data: $\chi 2 = 1473.442$, $df = 756$; $\chi 2/df = 1.958$; RMSEA = 0.044; CFI = 0.974; TLI = 0.972. With indices above the recommended levels, model modification was deemed not necessary. This final model explained 84% of the variance in adolescents' drinking intention; and 37%, 18%, and 10% of the variance in adolescents' drinking onset, current drinking, and binge drinking patterns, respectively. The strongest predictor of adolescents' drinking intention was PDNs ($\beta = 0.523$, $p < .001$), followed by PBC ($\beta = -0.387$, $p < .001$). The correlation between drinking attitude and drinking intention was small ($\beta = 0.160$, $p < .001$). Finally, adolescents' drinking intention was directly correlated with their earlier drinking onset ($\beta = -0.314$, $p < .001$), increased current drinking ($\beta = 0.323$, $p < .001$), and more binge drinking days ($\beta = 0.224$, $p < .01$). Unlike other psychosocial factors, adolescents' PBC only had a significant direct effect on adolescent drinking onset ($\beta = 0.330$, $p < .001$), but not on their current drinking or binge drinking patterns (see Figure 3.1).

Figure 3.1: Final structural model: The influences of psychosocial factors on adolescents' drinking intention and behaviors



Note: Solid lines indicate statistically significant paths. Dotted lines indicate a non-statistically significant path. * = p-value <.01, ** = p-value <.001

Mediation Analysis

Adolescents' drinking intention significantly mediated the relationships between all psychosocial factors and drinking behaviors either fully or partially (see Table 3.2). All but two had full meditation effects. These two included drinking intentions' partial mediation effects on the association between PDNs and binge drinking pattern (IE = 0.12, p = .004), as well as on the association between PBC and drinking onset (IE = 0.12, p <.001). Finally, adolescents' drinking intention significantly and fully mediated the relationships between adolescents' drinking attitude and all behavioral outcomes (drinking onset, current drinking, and binge drinking patterns).

Table 3.2: Mediation effects of psychosocial factors on adolescents' drinking intention and behaviors

Pathways A→B→C	Indirect Effect A via B to C	Direct effect A to C	95% C.I.	
			Lower	Upper
ATD→DI→DO	-0.050**	0.025 ^{NS}	-0.086	-0.015
ATD→DI→PD	0.052**	0.023 ^{NS}	0.018	0.086
ATD→DI→PB	0.036*	0.041 ^{NS}	0.007	0.065
PDNs→DI→DO	-0.165**	-0.047 ^{NS}	-0.258	-0.071
PDNs→DI→PD	0.169***	-0.137 ^{NS}	0.080	0.259
PDNs→DI→PB	0.117**	-0.250*	0.038	0.197
PBC→DI→DO	0.122***	0.344***	0.055	0.188
PBC→DI→PD	-0.125***	-0.064^{NS}	-0.188	-0.062
PBC→DI→PB	-0.087**	-0.011^{NS}	-0.143	-0.030

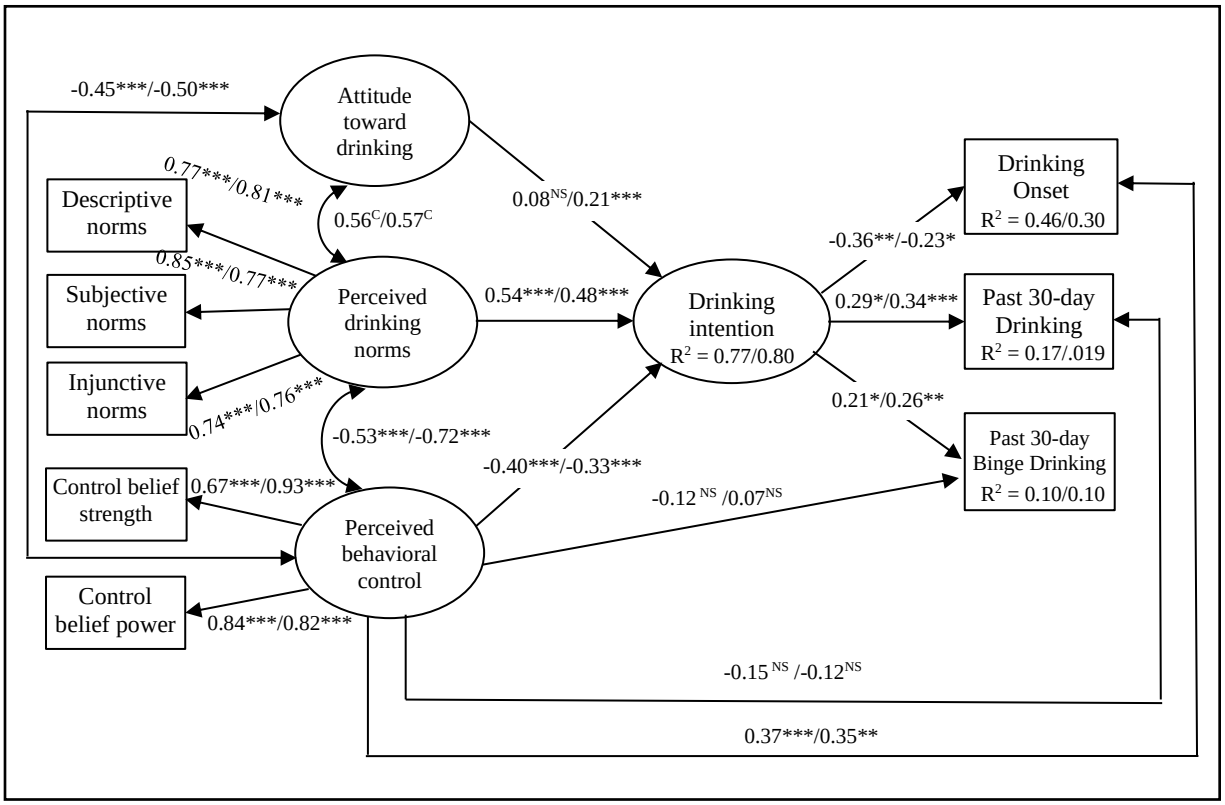
Note: Standardized indirect effects obtained from Mplus IND function. The mediation effect is the estimated indirect effects whose 95% bias-corrected confidence intervals (CIs) do not contain zero which indicated significant indirect effects. Partial mediation effect is underlined. ^{NS} = non-statistically significant after adding pathway from Aà C, * = p <.05, ** = p <.01, *** = p <.001 in indirect effects (A via B to C).

Sex Differences

As indicted in Table 3.3, the only statistically significant difference was the path coefficient from attitude to drinking intention ($\Delta \chi^2 = 3.554$, p <.05). Attitude did not have a significant effect on drinking intention in the male group ($\beta = 0.08$, $p = .204$), but did in the female group ($\beta = 0.21$, p <.001) (See Figure 3.2). Consistent with findings in our structural (base) model, the association between PDNs and drinking intention was found to be strongest across both sexes ($\beta = 0.48$ and 0.54, p <.001). The significant effect of adolescents' drinking intention on drinking onset was slightly higher for males, as compared to females ($\beta = -0.36$, p <.01 vs $\beta = -0.23$, p <.05).

For adolescent males, the model explained about 77% of the variance in drinking intention, 46% of the variance in drinking onset, and 17% of the variance in current drinking pattern. For adolescent females, the variances explained in drinking intention, drinking onset, and current drinking pattern were 80%, 30%, and 19%, respectively. However, there was an equivalent variance of 10% in binge drinking pattern for both groups.

Figure 3.2: The comparison model between male and female groups



Note: The standardized path coefficients and R^2 are presented in male/female. The levels of significance in path-coefficients are indicated as * = p <.05, ** = p <.01, *** = p <.001. NS indicated non-statistically significant path.

Table 3.3: Path coefficient comparisons between males and females

Pathways	Fit indices	$\Delta\chi^2$	Δdf	p-value
Constrained	χ^2=2497.291, *df*=1702; χ^2/*df*=1.467; RMSEA=0.045; CFI=0.969; TLI=0.971			
ATD→DI	χ^2=2517.148, *df*=1701; χ^2/*df*=1.480; RMSEA=0.045; CFI=0.969; TLI=0.970	3.554*	1	0.046
PDNs→DI	χ^2=2526.535, *df*=1701; χ^2/*df*=1.485; RMSEA=0.045; CFI=0.968; TLI=0.969	0.055	1	0.814
PBC→DI	χ^2=2520.644, *df*=1701; χ^2/*df*=1.482; RMSEA=0.045; CFI=0.968; TLI=0.970	3.234	1	0.072
DI→DO	χ^2=2531.309, *df*=1701; χ^2/*df*=1.488; RMSEA=0.045; CFI=0.968; TLI=0.969	0.582	1	0.445
PBC→DO	χ^2=2531.571, *df*=1701; χ^2/*df*=1.488; RMSEA=0.045; CFI=0.968; TLI=0.969	0.532	1	0.466
DI→PD	χ^2=2515.588, *df*=1701; χ^2/*df*=1.479; RMSEA=0.045; CFI=0.968; TLI=0.969	0.795	1	0.373
PBC→PD	χ^2=2515.016, *df*=1701; *χ2/df*=1.479; RMSEA=0.045; CFI=0.969; TLI=0.970	0.842	1	0.359
DI→PB	χ^2=2515.731x, *df*=1701; χ^2/*df*=1.479; RMSEA=0.045; CFI=0.969; TLI=0.970	0.000	1	0.983
PBC→PB	χ^2=2515.354, *df*=1701; χ^2/*df*=1.479; RMSEA=0.045; CFI=0.969; TLI=0.970	0.003	1	0.957

Note: Chi-square difference values obtained from Mplus DIFFTEST function. * = p <.05.

Discussion

This cross-sectional study examined the relationship between the TPB-based psychosocial factors and rural Thai adolescents' drinking intention and behaviors. Results from this study support the utility of the TPB as a framework to explaining rural Thai adolescents' drinking intention and behaviors. The current findings extend beyond prior findings about the

TPB's capacity in explaining adolescents' drinking intention after expanding traditionally defined "subjective norms" construct to include *descriptive* and *injunctive* norms to represent adolescents' perceived drinking norms (PDNs) more fully. In this study, our model explained 84% of variance in adolescents' drinking intention, which was much higher than the variance (36–67%) reported in prior TPB-based meta-analyses (Cook et al., 2014, McEachan et al., 2011). Importantly, to our knowledge, this study is the first to investigate the associations between adolescents' drinking intention and their drinking onset, particularly among rural Thai adolescents whose drinking onset was relatively early. This investigation is critical because literature has shown that early drinking onset during adolescence is a critical predictor of alcohol abuse during adulthood (Fisher et al., 2007, Kyrrestad et al., 2020; Zhao et al., 2020). Remarkably, our findings confirmed that a higher level of drinking intention strongly predicted adolescents' earlier drinking onset, with a high 37% of variance explained by the model. Hence, for all practical purposes, the TPB framework with the expanded perceived drinking norms R^2(PDNs) construct can better explain rural Thai adolescents' drinking intention and behaviors.

In contrast to the previous findings in which drinking attitude was the strongest predictor of drinking intention followed by subjective norms and PBC, respectively (Cook et al., 2016; Lac et al., 2013; Phuphaibul et al., 2011), results from the current study showed that PDNs was the strongest predictor followed by PBC. This latter finding may be due to the expansion of the PDNs construct in our modeling. This expansion is plausible because it captures adolescents' perceived drinking norms at the larger societal level. The augmentation of PDNs is critical for rural Thai adolescents because they reside in a society where underage drinking is viewed as fashionable and a way to foster social bonds (Glomjai, 2015; Kaewpramkusol et al., 2019). In our study, the magnitude of the effect of PDNs on drinking intention was slightly higher for rural

Thai adolescent males (β = 0.539, p <.001 vs. β = 0.482, p <.001) than females. This finding may be explained by the traditional Thai drinking culture, in which males drinking alcoholic beverages contributes to stereotypically masculine traits (i.e., masculinity, maturity, and leadership), while drinking is seen as an unfavorable behavior for females (Glomjai, 2015; Moolasart & Chirawatkul, 2012). Thus, to minimize rural Thai adolescents' drinking intention, reshaping their PDNs might be necessary.

Unlike previous studies, we found that drinking attitude was the weakest psychosocial predictor of rural Thai adolescents' drinking intention and even became non-significant in male model. This result suggests a potential paradigm shift in understanding adolescents' drinking intention and behaviors, particularly when rural Thai adolescents' perceived drinking norms are heavily shaped by the drinking norms expected in a larger societal level. It is possible that adolescents' pro-drinking attitude may be shaped by their perception of how people (peers and/or celebrities) in society act/behave regarding drinking (PDNs). This finding is consistent with other researchers' observations (Hohman et al., 2015; Rimal & Lapinski, 2015) in which adolescents perceived normative beliefs about drinking may affect their drinking attitude. Thus, it is possible that PDNs is an antecedent for adolescents' drinking attitude. Along the same lines, interventions targeting adolescents' PDNs may be more effective than those that emphasize on adolescents' drinking attitudes alone.

Previous literature has suggested that adolescents tend to engage in less drinking if they perceive greater control over their drinking behavior (Cutrín et al., 2020; Fisher et al., 2007; Phuphaibul et al., 2011). In our study, the influence of PBC on drinking behaviors seemed to vary by their drinking status. Increased PBC significantly buffered adolescents' drinking intention and onset, but not for adolescents who have already engaged in current or binge

drinking behaviors. Compared to non-drinkers, adolescent drinkers might be more likely to be influenced by peer pressure because they scored much lower on items dealing with peer refusal to drink. Interestingly, our mediation analyses revealed that the association between PBC and drinking onset was partially mediated by drinking intention. Moreover, despite the small effects (-.087 and -.125), drinking intention fully mediated the associations between PBC and drinking behaviors (current and binge drinking), inferring that manipulating adolescents' PBC could have a greater impact on decreasing drinking intention, delaying drinking onset, and reducing current and binge drinking behaviors among rural Thai adolescents.

Alarmingly, compared to previous national surveys (13.50–16.78 years) in Thailand (Assanangkornchai & Vichitkunakorn, 2020; Paileeklee et al., 2016; Tanaree & Vichitkunakorn, 2019), rural Thai adolescents' drinking onset, in this study, was 1.5 to 4.43 years earlier (M = 12.35; SD = 1.80). In addition, more than half (55.49%) of our participants had already consumed alcohol previously, with the earliest drinking age at 6. This finding provides a clear message that there is an urgent need for Thai policy makers and other health-related institutions to delay rural Thai adolescents' drinking onset. Additional efforts are needed to mitigate these adolescents' problematic drinking behaviors.

Despite the significance of our findings, a few limitations are noted. First, social desirability bias is a potential limitation because of the nature of self-reported approach and adolescents may under-report their drinking behaviors because the legal drinking age in Thailand is 20 years old. Second, recall bias may exist, particularly for items that asked adolescents to recall their drinking patterns or frequency in the past 30 days. Third, only biological sex was treated as a moderator in this analysis. Other potential confounders (school settings and family factors) should be considered in future analyses. Finally, due to the nature of the cross-sectional

survey design, caution should be applied while interpreting causal relationship. Future studies should employ a longitudinal design to confirm the effects of psychosocial factors on adolescent drinking intention and behaviors over time.

In conclusion, the confirmation of the role of PDNs and PBC on rural Thai adolescents' drinking intention and behaviors opens up doors for future interventions. For example, mitigating adolescents' PDNs derived from social interactions and fostering their PBC are promising for delaying their drinking onset and behaviors. Future interventions should target younger children, preferably prior to their first drink because underage drinking is a big risk factor for multiple alcohol-related health problems in adulthood. Increased efforts to delay rural Thai adolescents' drinking onset can minimize many alcohol-related behavioral and health problems not only during adolescence but also during adulthood.

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APPENDIX A: ADOLESCENT DRINKING PREVALENCE

Supplemental Table 3.1: The prevalence of adolescent alcoholic beverage drinking (n = 263)

Drinking patterns	**Total n (%)**	**Sex**	
		Male n (%)	**Female n (%)**
Age (years) at first drink (n=263)			
≤10	31(11.79)	19(14.39)	12(9.16)
11-12	106(40.30)	58(43.94)	48(36.64)
13-14	106(40.30)	46(34.85)	60(45.80)
15-16	20(7.61)	9(6.82)	11(8.40)
Total	263(100.00)	132(100.00)	131(100.00)
Drinking in past 30 days (n=263)			
Yes	111(42.21)	53(40.15)	58(44.27)
No	152(57.79)	79(59.85)	73(55.73)
Frequency of past 30 days drinking (n=111)			
1-3 days	100(90.09)	49(92.45)	51(87.93)
4-5 days	11(9.91)	4(7.55)	7(12.07)
Binge drinking in past 30 days (n=263)			
Yes	74(28.14)	40(30.30)	34(25.95)
No	189(71.86)	92(69.70)	97(74.05)
Frequency of past 30 days binge drinking (n=74)			
1-3 days	67(90.54)	37(92.50)	30(88.24)
4-5 days	7(9.46)	3(7.50)	4(11.76)

APPENDIX B: MEASUREMENT MODEL RESULTS

Supplemental Table 3.2: Estimates of measurement model

Variables	Items	Factor loading	SE	AVE	CR	Cronbach's alpha
Attitude toward drinking	ATD1	0.77	0.03	0.65	0.90	0.88
(ATD)	ATD2	0.80	0.03			
	ATD3	0.86	0.02			
	ATD4	0.85	0.02			
	ATD5	0.74	0.03			
Perceived drinking norms	DN1	0.84	0.04	0.44	0.75	0.71
(PDNs)	DN2	0.62	0.04			
Descriptive norm (DN)	DN3	0.61	0.04			
	DN4	0.54	0.05			
Subjective norm (SN)	SN1	0.82	0.02	0.69	0.92	0.86
	SN2	0.86	0.02			
	SN3	0.79	0.02			
	SN4	0.89	0.02			
	SN5	0.80	0.03			
Injunctive norm (IN)	IN1	0.75	0.03	0.62	0.89	0.86
	IN2	0.82	0.03			
	IN3	0.71	0.03			
	IN4	0.86	0.03			
	IN5	0.81	0.03			
Perceived behavioral	CBS1	0.80	0.02	0.69	0.94	0.92
control (PBC)	CBS2	0.85	0.02			
Control belief strength	CBS3	0.81	0.02			
(CBS)	CBS4	0.84	0.02			
	CBS5	0.86	0.02			
	CBS6	0.86	0.02			
	CBS7	0.82	0.02			

Supplemental Table 3.2 (cont'd)

Variables	Items	Factor loading	SE	AVE	CR	Cronbach's alpha
Control belief power	CBP1	0.77	0.03	0.69	0.94	0.91
(CBP)	CBP2	0.88	0.02			
	CBP3	0.92	0.01			
	CBP4	0.80	0.02			
	CBP5	0.80	0.02			
	CBP6	0.86	0.02			
	CBP7	0.80	0.02			
Drinking intention (DI)	DI1	0.79	0.02	0.77	0.94	0.89
	DI2	0.86	0.02			
	DI3	0.93	0.01			
	DI4	0.90	0.02			
	DI5	0.89	0.02			

Note: All standardized factor loadings (λ) are significant at $p < .001$. SE = standard error; AVE = average variance extracted; CR = composite reliability.

APPENDIX C: CORRELATION MATRIX

Supplemental Table 3.3: Results for measurement model assessment and correlations between used variables

Variables	1	2	3	4	5	6	7	8	9	Mean	SD
(1) ATD	0.80									12.68	4.60
(2) DN	0.38**	0.66								10.95	3.32
(3) SN	0.44**	0.68**	0.83							11.50	4.85
(4) IN	0.46**	0.53**	0.59**	0.79						11.07	4.57
(5) CBS	-0.39**	-0.36**	-0.40**	-0.35**	0.83					21.86	8.04
(6) CBP	-0.39**	-0.33**	-0.41**	-0.42**	0.66**	0.83				24.24	7.53
(7) DI	0.61**	0.66**	0.66**	0.61**	-0.59**	-0.62**	0.88			24.24	7.53
(8) DO	-0.34**	-0.41**	-0.38**	-0.34**	0.46**	0.48**	-0.54**	-		9.65	1.80
(9) PD	0.28**	0.33**	0.28**	0.20**	-0.31**	-0.30**	0.42**	-0.38**	-	1.89	1.11
(10) PB	0.23**	0.25**	0.19**	0.07*	-0.22**	-0.23**	0.30**	-0.29**	0.87**	1.89	1.14

Note: Correlations of the measurement model was estimated using the TECH4 command in Mplus; the diagonal values in purple indicated the square root of average variance extracted (AVE); ATD = attitudes toward drinking; DN = descriptive norm; SN = subjective norm; IN = injunctive norm; PBC = perceived behavioral control; DI = drinking intention; DO = drinking onset; PD = past 30-day drinking pattern; PB = past 30-day binge drinking pattern; * = p <.05, ** = p <.001.

CHAPTER 4: THE ROLE OF ALCOHOL-RELATED MEDIA EXPOSURE ON RURAL THAI ADOLESCENTS' DRINKING INTENTION

Abstract

This study explored the effects of alcohol-related media exposure on rural Thai adolescents' drinking intention and how these associations were mediated by various psychosocial factors (perceived drinking norms, attitudes, and perceived behavioral control [PBC]) and moderated by biological sex. A total of 474 rural Thai adolescents participated (M_{age} = 14.54; *SD* = 0.92; 50.63% male). Structural equation modeling demonstrated that pro-drinking message exposures (as compared to anti-drinking messages) had a significantly greater undesirable impact on adolescents' perceived drinking norms, attitudes, and PBC that subsequently contributed to increased drinking intention. Although the mediation effects were fairly similar between males and females, the negative impact of pro-drinking message exposure on adolescents' PBC was significantly stronger for males (β= -0.76 vs -0.58). Thus, mitigating pro-drinking media exposures is one promising approach for improving various psychosocial factors and subsequently decreasing rural Thai adolescents' drinking intention.

Introduction

Alcoholic beverages are the most popular substance of choice among adolescents globally as well as in Thailand (Assanangkornchai et al., 2020; Centers for Disease Control and Prevention [CDC], 2022). According to a Thailand school health surveillance survey, roughly 37.7% of Thai students in grades 7 to 12 (ages 13 to 18 years) have been exposed to drinking alcoholic beverages, with 30.8 % of them categorized as a current drinker—defined as consuming an alcoholic beverage at least once within the past 30 days (Paileeklee et al., 2016). In fact, compared to Thai adolescents in general, rural Thai adolescents have a significantly

higher prevalence of alcohol drinking (27% vs. 22%; Assanangkornchai et al., 2018) and an earlier drinking onset (Mean age 11.3 vs. 12.8; Hongthong et al., 2013; Luecha et al., 2019). The literature has shown that escalated exposure to alcohol-related messages over time can increase adolescents' drinking intention (Finan et al., 2020; Kantawong et al., 2021). Importantly, in our prior work (Kantawong et al., 2022), drinking intention moderately predicted rural Thai adolescents' early drinking onset (β = -0.31, p <.001), current drinking status (β = 0.32, p <.001), and binge drinking behavior (β = 0.22, p <.01). However, it is unclear if growing media exposure to pro-drinking messages can impact rural Thai adolescents' drinking intention. Thus, the three-fold purpose of this study was to: (1) explore how various alcohol-related media exposures (pro-drinking and anti-drinking messages) may influence rural Thai adolescent drinking intention; (2) examine whether rural Thai adolescents' psychosocial factors (i.e., attitudes toward drinking, perceived drinking norms [PDNs], and perceived behavioral control [PBC]) mediate the relationship between alcohol-related media exposures and drinking intention; and (3) compare biological sex differences in these associations.

Background

Alcohol-Related Media Exposure

Extensive scientific evidence suggests that adolescents' drinking intention and behaviors are primarily rooted in their social need to feel that they are connecting with others, fitting in, or being accepted by the "correct" crowd (Nesi et al., 2017; Ridout et al., 2012; Smit et al., 2022). According to Ecological System Theory (EST), adolescents' drinking behaviors are a consequence of their observations and interactions with larger multi-environmental systems (Bronfenbrenner, 1994; Bronfenbrenner & Morris, 2006). For example, existing studies have shown that adolescents' drinking attitudes and perceptions (perceived drinking norms) are

substantially influenced by their social interactions within the environment (Cislaghi & Heise, 2018; Rimal & Lapinski, 2015). In particular, the influences derived from the exo-system (a surrounding in which adolescents might not be involved in directly but could be affected by what had occurred within the context) may include their parents, close friends, and online peers. The macro-system, for example, encompasses the social, cultural and policy levels of influence that shape normative drinking beliefs within the neighborhood, school, and mass media (Lee, 2011; Rimal & Lapinski, 2015). These larger levels of influence are important to consider when investigating adolescents' drinking intention because the current generation of adolescents is immersed in a media-saturated environment that involves being "always online."

Despite the desire to connect and interact with others virtually, adolescents' favorable drinking norms may be concomitantly formulated while maintaining their "*status quo"* in this digital era (Dolcini, 2014; Marino et al., 2020). In addition, as Internet accessibility increases, the pervasiveness of pro-drinking messages seen on various social media indicates that social media has become a new marketing venue for alcohol manufacturers (Finan et al., 2020; Jackson et al., 2018). In fact, research has found that although adolescents were not proactively seeking alcohol-related information, they were exposed to numerous pro-drinking messages through various online platforms (Cavazos et al., 2015; McClure et al., 2016; Nesi et al., 2017).

Adolescents' growing interactions with online peers via social networks (e.g., Facebook, Twitter, and Instagram) can further increase their exposure to pro-drinking messages (Westgate et al., 2014). Examples of pro-drinking posts may include photographs of a dinner table with beverages, group party snapshots of people who are carrying alcoholic beverages, and close-ups of filled beverage glasses (Nesi et al., 2017; Svensson & Johnson, 2020). Studies have noted that these pro-drinking posts are typically of an interactive nature and can promote adolescents'

positive view of alcohol drinking if they are paying sufficient attention (Cavazos et al., 2015; Finan et al., 2020). Earlier studies have documented anti-drinking messages (often produced by the federal government or other health organizations) provided through communication campaigns aimed at informing the public of the adverse consequences of drinking (Ho et al., 2014), and emphasizing the financial losses and dangers related with alcohol drinking (Dunstone et al., 2017). Anti-drinking messages have been mostly available on television or other traditional media platforms such as magazines and billboards, which often are perceived as being uninteresting and unlikely to reach current adolescents (Dunstone et al., 2017; Esser & Jernigan, 2018).

Research has shown that the effects of alcohol-related media exposure may be mediated through individual affective and cognitive responses (McClure et al., 2013; Sargent & Babor, 2020). In another words, adolescents not only need to be exposed to alcohol-related messages, but also need to pay attention and be attracted to these messages (Henehan et al., 2020; Ho et al., 2014). As evidenced in previous studies, adolescents' own and peer attention to pro- and anti-drinking messages can alter adolescents' attitudes toward drinking (Berey et al., 2017; Gentile et al., 2019) and perceived drinking norms (Berey et al., 2017; Kantawong et al., 2021). In fact, higher exposure to pro-drinking messages was shown to increase adolescent drinking intention by around 49% (Bigman et al., 2019). However, prior studies suggested that the magnitude of such influence may differ by adolescent's biological sex (Jones & Magee, 2011; Morgenstern et al., 2017). This premise is supported by previous studies in which adolescent females' drinking intention was more likely to be influenced by alcohol-related posts on the Internet and online social media, as compared to males (Chen et al., 2017; Mundt, 2011). Nevertheless, little is currently known about how these alcohol-related media exposures may affect rural Thai

adolescents' drinking intention, or how this association may differ by biological sex.

Psychosocial Factors

At a micro-level, adolescents' drinking intention (an intra-personal factor) denotes their motive or deliberate decision to engage in actual drinking behavior (Hagger, 2019). According to the Theory of Planned Behavior (TPB; Ajzen,1991; 2011), one's intention, which is the motivation or conscious plan to engage in actual drinking behaviors, depends on an individual's perceived behavioral, normative, and control beliefs. Significant antecedents of adolescents' drinking intention include adolescents' perceived drinking attitude, subjective norms of their friends' and/or parents' approval or disapproval toward alcohol use, and adolescents' perceived behavioral control (PBC) in exerting control over alcohol use (Ajzen, 2011; Stoddard & Pierce, 2016).

In a meta-analysis with 46 studies conducted globally, Cooke and colleagues (2016) found that drinking intention was highly correlated with attitudes toward drinking (r = 0.62), followed by subjective norms (r = 0.47) and PBC (r = -0.31) and that these psychosocial factors explained 25% to 52% of variance in adolescents' drinking intention. In addition, in our previous study, results from structural equation modeling showed that rural Thai drinking intention explained about 37%, 18%, and 10% for drinking onset, current drinking, and binge drinking patterns, respectively (Kantawong et al., 2022).

Although a TPB-based investigation is adequate to understand adolescents' intra-personal level of behaviors, it may not be sufficient to understand influences derived from the macro- and exo-system levels, given that adolescents' drinking intention may be shaped by their inter-personal interactions with complex societal and cultural norms (Elmore et al., 2017; Shulman et al., 2017). An expanded definition of adolescents' perceived drinking norms is necessary for the

current generation of adolescents (Cox & Bates, 2011; Rimal & Lapinski, 2015), who are growing up in a media-saturated world. Thus, it is critical to consider multiple normative drinking beliefs nested in various societal and cultural levels which extend beyond the specific or narrow parental and/or peer approvals described in the TPB (Telzer et al., 2018). Increasing evidence supports the inclusion of adolescents' normative beliefs toward drinking derived from proximal (close friends, parents) and distal (virtual/online peers and idols) stimuli, particularly from social networking sites (SNS), such as Facebook, Twitter, and Instagram (Nesi et al., 2017; Hong et al., 2013). This situation has occurred because modern technologies have altered the ways adolescents socialize with others on complex societal levels (MacArthur et al., 2020; Underwood & Ehrenreich, 2017). Consequently, adolescents' perceived drinking norms, attitudes, and control regarding their drinking intention may be more sophisticated than previously envisioned (Hong et al., 2013; Svensson & Johnson, 2020). It is indeed possible that adolescents' PDNs, drinking attitude, and PBC may buffer the impacts of alcohol-related media exposures and the buffering effects may vary between biological sexes. Thus, the purpose of this study was to examine 1) the influences of alcohol-related media exposure (pro- and anti-drinking message attention) on drinking intention among rural Thai adolescents; 2) the mediation effects of psychosocial factors of the TPB (perceived drinking norms [PDNs], attitudes, and perceived behavioral control [PBC]) on above associations; and 3) the differences in these associations between adolescent males and females.

Methods

Sample

A total of 474 adolescents (7^{th}–9^{th} graders) participated in this cross-sectional survey. Using a multi-stage random sampling technique, 8 secondary schools were randomly selected

from12 eligible public district schools across Chiang Mai Province, Thailand and used as recruitment sites. These 12 eligible schools were considered to be both rural and underserved (Pheutikankit, 2015) because they are located more than 150 kilometers from the provincial capital of Chiang Mai, and the average annual household income is lower than that of metropolitan areas (approximately 9,260 USD [Office of the National Economic and Social Development, 2022]). The A-Priori Sample Size for Structural Equation Models Software Version 4.0 (Cohen, 1988; Soper, 2022) was utilized to estimate the sample needed for this study. With four latent variables and 11 observed variables, type I error at 0.05 and an effect size of 0.30, a sample size of 173 per model was projected to achieve 90% power. The selected effect size was based on the effect sizes noted with urban Thai adolescents (d = 0.32–0.44; Phuphaibul et al., 2011). However, to compare biological sex differences, a minimal sample of 306 participants was required to perform comparison structural equational modeling. We oversampled by about 35% to account for the potential nonresponse rate and missing data. Initially, 495 consented adolescents met the inclusion criteria and obtained permission from their parents who received recruitment packages. After three reminders, a total of 485 respondents returned their surveys (nonresponse rate=2%). After removing 11 cases with excessive missing values in the key outcomes (reporting drinking status, onset, and patterns), our final sample size was 474.

Procedures

Permission for data collection was obtained from the Secondary Educational Service Area Office 34, Ministry of Education, Thailand, where this research was conducted. In addition, IRB approval was granted from Michigan State University's Biomedical and Health Institutional Review Committee (STUDY00006056) prior to conducting the study. To recruit participants, the

researchers (first author and two research assistants trained by the first author) first contacted the school health teachers from each randomly selected school. The researchers then met with students in an orientation session to introduce the study's purpose and data collection procedures. Interested adolescents were asked to mail or provide contact information to the researcher (first author) or the school health teacher. Sixty adolescents from each selected school (20 adolescents per grade, balancing for adolescents' biological sex) were then randomly selected to receive the recruitment package, which included parental consent and child assent forms. A total of 495 adolescents returned their signed parental consent and child assent forms and were scheduled to complete the paper-pencil survey. Each adolescent received a pre-stamped envelope for returning the survey. Adolescents were asked to complete their survey (roughly 20–50 minutes) at their convenience, preferably at school. They also had the option of returning their completed survey in the provided envelope either by mail or in person. Almost all adolescents (97.37%; n=482) returned their completed surveys in a sealed envelope via the designated locked box at their schools.

Measurements

Endogenous variable

Drinking Intention. Adolescents' future alcohol drinking intention was assessed using a 5-item, 5-point Likert scale (1 = certainly no, 5 = definitely yes [Ho et al., 2014]). Adolescents were asked to weigh their possibility of drinking alcohol over the following month, the next year, the next five years, and in the future, while the final question asked adolescents how much they would like to drink alcohol if one of their closest friends provided them alcoholic beverages. A high sum score indicates a strong desire to drink. In this current study, the internal consistency was adequate (α = 0.89), which was close to the original developed scale (α = 0.91 [Ho et al.,

2014]).

Exogenous variables

Alcohol Related Media Exposure. The validated Thai version Questionnaire was used to assess adolescents' media exposure to pro- and anti-drinking messages in the past 30 days (Ho et al., 2014). Each pro- and anti-drinking message consists of two subscales including adolescent's own attention and perceived peer attention. For adolescents' own attention, participants were asked to respond to a single question about how much they paid attention to pro- and anti-drinking messages in five different media sources, with choices ranging from 1 (little attention) to 5 (very close attention). For adolescents' perceived peer attention, a 2-item, 5-point Likert scale ranging from 1 (little attention) to 5 (very close attention) was used to examine their perceived peer attention to pro- and anti-drinking messages. The reliabilities of these subscales (α = 0.79 - 0.88) were comparable to the original scale (α = 0.77 - 0.91 [Ho et al., 2014]).

Perceived Drinking Norms (PDNs). The validated Thai Adolescents' Perception of Alcohol Drinking Questionnaire was used to assess adolescents' perceived norms regarding drinking through three different aspects of norms (subscale) (Ho et al., 2014). Adolescents rated each subscale item on a 5-point Likert scale from 1 (not acceptable/extremely implausible) to 5 (very acceptable/very likely). Higher subscale total scores indicate greater perception of social acceptance of drinking. *Descriptive Norm* was assessed by evaluating adolescents' perception about the number of their close friends (or people around their age) who drink alcohol using a 4-item questionnaire. *Subjective Norm* was assessed by using a 5-item measure to assess the degree to which adolescents' perception of their drinking would be approved or disapproved by their significant people. *Injunctive Norm* assessed adolescents' perception of how acceptable adolescent alcohol drinking is in Thai society using a 5-item scale. The internal consistency of

these three subscales ranged from 0.71 to 0.86, which was almost identical to the original ones (α = 0.72-0.84 [Ho et al., 2014]).

Perceived Behavioral Control (PBC). Adolescents' PBC consists of two subscales. *Control Belief Strength* assessed how easy or difficult it was for adolescents to exert control over their drinking behavior through 7 items (e.g., "I will not drink alcohol even if my close friends drink"). *Control Belief Power* assessed how well adolescents were performing in relation to their ability to exercise control over their drinking behavior through 7 items. An example of an item is, "I can get along with my friends without drinking alcohol." Possible responses to the questions were 1 = "much more difficult/most unlikely" to 5 = "much easier/most likely." A higher total score on each subscale indicates a stronger sense of control over drinking behavior. The reliabilities of these two subscales were slightly lower than those reported in original version (α = 0.92-0.91 vs. α = 0.94-0.96, respectively [Phuphaibul et al., 2011]).

Attitude Toward Drinking. Adolescents' attitude regarding alcohol drinking was accessed using a 5-item, 5-point bipolar adjective scale. Adolescents were asked to rate their attitude about alcohol drinking for the following items: "Immature–Grown up," "Not good-looking–Good-looking," "Boring– Exciting," "Not cool–Cool," and "Not popular–Popular" (Ho et al., 2014). The original Cronbach's alpha was 0.80 (Ho et al., 2014). A higher sum score represents a more favorable attitude toward alcohol drinking. In this study, the reliability of this measure was excellent (α = 0.88).

Demographics. Adolescents' demographic information was gathered through a 17-item questionnaire, which was adapted from the National School Health Survey (Phuphaibul et al., 2011). The questionnaire consists of two parts. In Part 1, adolescents were asked about their age, sex, religion, grade level, and grade point average (GPAs). In Part 2, they were asked about their

social media availability/usage, smartphone ownership, degree of data access, estimated screen time spent on social media per day, and patterns of alcohol-related media exposures (including alcohol-related advertisements, online postings, and/or discussions).

Data and Statistical Analysis

Descriptive statistics (means and standard deviations) and Cronbach alpha for this sample were estimated using SPSS 26 (IBM Corp., Armonk, NY, USA). Prior to conducting any inferential analysis, data were initially checked for missingness; 11 cases (2.27%) without the responses in key outcomes and other important variables were subsequently removed from further analysis. After removal, only 0.45% of the missing value was detected. Little's Missing Completely at Random Test (MCAR) embedded in SPSS was then used to check for missing data patterns (Little & Rubin, 2002; Li, 2013). The results indicated that the missing data patterns appeared to be at random (χ^2 = 586.112, df = 664, p = 0.63). In order to enhance the robustness (Dong & Peng, 2013; Jakobsen et al., 2017), multiple imputations (10 datasets) were conducted using Mplus to obtain the missing values within each variable. In addition, normality assumptions were evaluated to minimize bias in our analysis (Ghasemi & Zahediasl, 2012). We found that not all study variables were normally distributed according to the Kolmogorov–Smirnov test. However, the skewness (range from -0.16 to 0.75) and kurtosis (range from -1.13 to -0.13) were not severe because they did not surpass 2 and 7, respectively (Kline, 2005; Kim, 2013).

Mplus version 8.6 (Muthén & Muthén, 2017) with the weighted least square mean and variance adjusted (WLSMV) was employed to examine both the measurement and structure model. This estimator was chosen to protect against the potential violation of multivariate normality and deal with ordinal indicator (Likert-type scales) issues, which lead to inflating chi-

square statistics, biasing standard errors, and downward-biasing of factor loading magnitude when applying the traditional maximum likelihood estimator (Beauducel & Herzberg, 2006; Brown, 2015, Li, 2016). Due to the well-known oversensitivity of the Chi-square test with large sample sizes and model complexity (Barrett, 2007), range model fit indicators were considered when χ^2/df ratio ≤ 3 (Hair et al., 2010; Kline, 2016), comparative fit index (CFI) and Tucker-Lewis index (TLI) ≥ 0.95 (Hair et al., 2010; Hu & Bentler, 1999), and the root mean square error of approximation (RMSEA) < 0.05 (Chen et al., 2008; Hu & Bentler, 1999).

Confirmatory factor analysis (CFA) was performed to test the adequacy of the measurement model. After the measurement model was established, a full structural model was performed to illustrate the significance and magnitude of the associations between the exogenous and endogenous variables. Mediation analysis was implemented using Mplus IND function. In this process, 5,000 bootstrap samples and a 95% bias-corrected confidence interval were utilized to determine the statistical significance of indirect effects (Hayes, 2013). DIFFTEST procedure embedded in Mplus was implemented to assess the statistical significance of each path coefficient between the male and female models. The analysis began with the most constrained model (the nest model) in which all pathways were set to be equal between male and female models. The pathway then was released one at a time to determine group differences by examining the changes in chi-square values ($\Delta\chi^2$).

Results

Demographics of Participants

The participants' demographic information is shown in Table 4.1. A total of 474 adolescents participated in the study, with fairly equal distribution between males and females (50.63% male; n=240) and grades (grade 7 = 32.91%, grade 8 = 33.97%, grade 9 = 32.12%). The

average age of the participants was 14.54 years (*SD*= 0.92), with a range from 12.17 to 17.58 years. Nearly half the female adolescents (49.15%; n=115) had an excellent grade point average (GPA ≥ 3.50), while the majority of male adolescents (47.50%; n=114) had a good GPA (GPA = 2.50-3.49). Almost all of them (97.88%; n = 462) owned a smartphone and 98.95% (n = 469) reported current use of social media. Approximately three quarters of participants spent more than 3 hours/day using social media (71.31%; n = 338). More than half the students (59.28%; n = 281) reported they had been exposed to alcohol-related media from various platforms in the past 30 days, while 69.20% (n = 328) had seen various drinking-related postings (forum or discussion) from their online peers including social networks such as Facebook, Line, Twitter, and Instagram. Approximately 44.51% (n = 211) of participants reported themselves as having drinker status (drink at least once in their lifetime), with 23.42% (n= 111) reporting that they had consumed an alcoholic beverage in the past 30-days, which was defined as being a current drinker in this study.

Table 4.1: Participant characteristics: characterized by adolescent sex (n = 474)

Demographic characteristics	Total n (%)	Male (240) n (%)	Female (234) n (%)
Grade			
Grade 7	156 (32.91)	83 (34.58)	73 (31.20)
Grade 8	161 (33.97)	79 (32.92)	82 (35.04)
Grade 9	157 (33.12)	78 (32.50)	79 (33.76)
Grade point average (GPA)			
Excellent (3.50–4.00)	187 (39.45)	72 (30.00)	115 (49.15)
Good (2.50–3.49)	214 (45.15)	114 (47.50)	100 (42.73)
Fair (1.50–2.49)	64 (13.50)	46 (19.17)	18 (7.69)
Poor (<1.50)	9 (1.90)	8 (3.33)	1 (0.43)

Table 4.1 (cont'd)

Demographic characteristics	Total n (%)	Male (240) n (%)	Female (234) n (%)
Smartphone ownership (n=472)			
Yes	462 (97.88)	237 (98.75)	226 (97.41)
No	10 (2.12)	3 (1.25)	6 (2.59)
Social media use			
Yes	469 (98.95)	238 (99.17)	231 (98.72)
No	5 (1.05)	2 (0.83)	3 (1.28)
Estimated time spent on social media a day			
≥3 hours	338 (71.31)	162 (67.50)	176 (75.21)
2–3 hours	74 (15.61)	38 (15.84)	36 (15.39)
1–2 hours	53 (11.18)	32 (13.33)	21 (8.97)
<1 hour	9 (1.90)	8 (3.33)	1 (0.43)
Alcohol-related media exposure in the past 30 days			
Yes	281 (59.28)	139 (57.92)	142 (60.68)
No	193 (40.72)	101 (42.08)	92 (39.32)
Drinking-related post exposure from online social networking friends in the past 30-day			
Yes	328 (69.20)	161 (67.08)	167 (71.37)
No	146 (30.80)	79 (32.92)	67 (28.63)
Drinking experience			
Yes	211 (44.51)	108 (45.00)	103 (44.02)
No	263 (55.49)	132 (55.00)	131 (55.98)
Drinking within the past 30-days			
Yes	111 (23.42)	53 (22.08)	58 (24.79)
No	363 (76.58)	187 (77.92)	176 (75.21)

Measurement Model

The findings from the confirmatory factor analysis (CFA) are summarized in Table 4.2. Our initial measurement model produced an excellent fit to the data (χ^2 = 2431.761, df = 1219, χ^2/df = 1.994, RMSEA = 0.046, CFI = 0.961, and TLI = 0.958); hence, model modification was deemed unnecessary. As shown in Table 4.2, standardized factor loadings were mostly above the recommended threshold of 0.60 (Kline, 2016), except for one indicator within the descriptive norm construct (λ = 0.54). Despite this occurrence, we included this item because it assessed an important aspect of descriptive norms (i.e., the popularity of underaged drinking in Thai society) and other indicators within the same construct had good loadings (λ range= 0.61-0.84; Hair et al., 2010). Regarding discriminant validity, the inter-factor correlations between all constructs were below 0.85, indicating adequate discriminant validity at the measurement level (Henseler et al., 2015). In addition, composite reliability for all measures was greater than the cutoff value of 0.50 (range from 0.75–0.94); and the Cronbach's alphas for all measures ranged from 0.71 to 0.92 (all above the required threshold of 0.70), indicating good internal consistency reliability (Cronbach, 1951; Hair et al., 2011).

Structural Model

In order to understand the influences of alcohol-related media exposure (pro- and anti-drinking message attention) on drinking intention among rural Thai adolescents, a structural modeling was conducted. This is to evaluate if our model fitted to the data and if the associations (direct and indirect) between exogenous and endogenous variables reached the level of statistical significance. Based on the proposed global fit indices, our final structural model produced a good fit with the data (χ^2 = 2385.901, *df* = 1253; χ^2/*df* = 1.904; RMSEA = 0.044; CFI = 0.964; TLI = 0.962). The modification indices did not show the need to add or remove a pathway. Figure 4.1

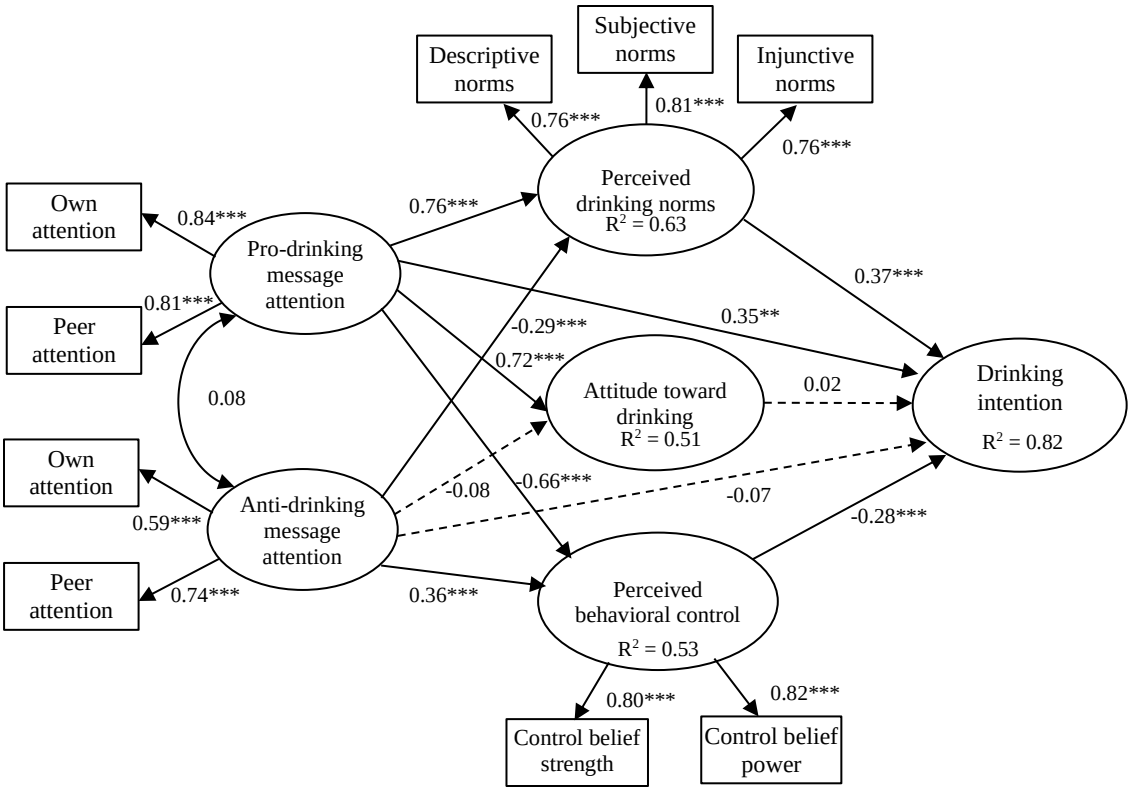
depicts the graphical description of the path coefficients for our final structural model. The final model explained 82% of variance in adolescents' drinking intention, and 51%, 63%, and 53% of variance in adolescents' attitude toward drinking, PDNs, and PBC, respectively. Increased pro-drinking message exposures directly and significantly predicted adolescents' drinking intention (β = 0.35, p = .007), while anti-drinking message exposure did not significantly influence their intention to drink. Adolescents' pro-drinking message exposure emerged as a significant predictor for all TPB-based psychosocial factors, including attitude toward drinking (β = 0.72, p < .001), PDNs (β = 0.76, p < .001) and PBC (β = -0.66, p < .001). However, adolescents' anti-drinking message exposure only significantly predicted PDNs (β = -0.29, p < .001) and PBC (β = 0.36, p < .001), but not their attitude toward drinking. The moderating effect of PDNs on adolescents' drinking intention (β = 0.37, p < .001) was slightly higher than the effects derived from PBC (β = -0.28, p < .001), while the effect of drinking attitude was not significant for drinking intention (See Figure 4.1).

To explore the mediation effects of psychosocial factors of the TPB, Mplus IND function with bootstrapping was employed. Table 4.4 illustrates the meditation effects of psychosocial factors (drinking attitude, PDNs, and PBC) on the relationships between alcohol-related media exposures and drinking intention. Adolescents' drinking attitude was not a significant mediator, while adolescents' PDNs and PBC emerged as significant mediators that fully or partially mediated these relationships. For example, the relationship between pro-drinking exposure and drinking intention was partially mediated by PDNs (IE_{male} = 0.26, p = .021 vs IE_{female} = 0.25, p = .005) and PBC (IE_{male} = 0.16, p = .013 vs IE_{female} = 0.17, p = .001) for both males and females. However, the association between anti-drinking message exposure and drinking intention was fully mediated by PDNs (IE_{male} = -0.11, p = .044 vs IE_{female} = -0.10, p = .014) and PBC (IE_{male} = -

0.07, p = .038 vs IE_{female} = -0.12, p = .005) for both groups.

To examine the differences between adolescent males and females, a group comparison model was performed. Group comparison analysis revealed that the only significant difference between males and females was the association between pro-drinking exposures and adolescents' perceived behavioral control ($\Delta \chi^2$ = 8.288, p = .004). The magnitude of the association was significantly and negatively stronger for males (β = -0.76 vs. -0.58, p < .001). Although not statistically different between males and females (see Table 4.3), adolescents' pro-drinking message exposures emerged as the strongest predictor for both male and female adolescents' drinking intention (β_{male} = 0.45, p = .028 and β_{female} = 0.40, p = .041). Similarly, the prediction of pro-drinking message exposure on PDNs (β = 0.83 vs β = 0.75, p < .001) and on drinking intention (β = 0.45 vs β = 0.40, p < .05) was slightly stronger for males. However, the buffering effect of anti-drinking message exposure on adolescents' PBC (β = -0.41 vs β = -0.34, p < .001) was slightly higher for females. Our model in males explained about 85% of the variance in drinking intention, and 51%, 74% and 62% of the variance in drinking attitude, PDNs, and PBC, respectively. For the model with females, the variances explained in drinking intention, attitude, PDN, and PBC were 82%, 50%, 61%, and 46%, respectively.

Figure 4.1: Final structural model of rural Thai adolescents (base model)



Note: All path coefficients are standardized coefficient; solid lines indicate statistically significant paths. Dotted lines indicate a non-statistically significant path. * = p<.05, ** = p<.01, and ***=p<.001.

Table 4.2: Correlations among measured variables and the results from the measurement model

Variables	1	2	3	4	5	6	7	8	9	10	11	λ range	CR	α
1 Pro-O	-											0.77-0.93	0.93	0.88
2 Pro-P	0.77***	-										0.81-0.89	0.90	0.80
3 Anti-O	0.03	0.02	-									0.67-0.90	0.91	0.86
4 Anti-P	-0.07	-0.04	0.48***	-								0.81-0.89	0.90	0.79
5 ATD	0.57***	0.57***	0.01	-0.05	-							0.74-0.86	0.90	0.88
6 DN	0.36***	0.44***	-0.10	-0.17**	0.38***	-						0.54-0.84	0.75	0.71
7 SN	0.43***	0.47***	-0.13**	-0.11*	0.44***	0.68***	-					0.79-0.90	0.92	0.86
8 IN	0.45***	0.46***	0.01	-0.11*	0.46***	0.53***	0.59***	-				0.71-0.86	0.89	0.86
9 CBS	-0.42***	-0.34***	0.16**	0.20***	-0.39***	-0.36***	-0.39***	-0.35***	-			0.80-0.86	0.94	0.92
10 CBP	-0.41***	-0.36***	0.10*	0.12*	-0.39***	-0.33***	-0.41***	-0.42***	0.66***	-		0.77-0.92	0.94	0.91
11 DI	0.68***	0.63***	-0.14**	-0.14**	0.61***	0.66***	0.65***	0.61***	-0.60***	-0.62***	-	0.79-0.93	0.94	0.89
Mean	10.61	6.01	12.66	5.37	12.68	10.95	11.50	11.07	21.86	24.24	12.47			
SD	4.61	2.18	4.97	1.94	4.60	3.32	4.85	4.57	8.04	7.53	5.48			

Note: The values are the correlation estimates reported from TECH4 command in Mplus. SD = standard deviation; λ = factor loadings; CR = composite reliability; α = Cronbach's alpha. * = p < .05, ** = p < .01, *** = p < .001. Pro-O = pro-drinking exposure: own attention; Pro-P = pro-drinking exposure: peer attention; Anti-O = anti-drinking exposure: own attention; Anti-P = anti-drinking exposure: peer attention; ATD = attitudes toward drinking; DN = descriptive norm; SN = subjective norm; IN = injunctive norm; CBS = control belief strength; CBP = control belief power; DI = drinking intention.

Table 4.3: Sex comparison in path coefficients

Pathways	Male Model		Female Model		Sex Difference		
	β (SE)	SE	β (SE)	SE	Δx^2	ΔDF	p-value
ATD→DI	0.04^{ns}	0.06	-0.02^{ns}	0.09	0.212	1	0.645
PDNs→DI	0.31*	0.14	0.33**	0.12	1.573	1	0.209
PBC→DI	-0.21*	0.09	-0.30**	0.09	1.417	1	0.234
Pro-D→DI	0.45*	0.20	0.40*	0.19	0.396	1	0.529
Anti-D→DI	-0.07^{ns}	0.10	-0.16^{ns}	0.11	1.873	1	0.171
Pro-D→ATD	0.72***	0.04	0.71***	0.05	2.185	1	0.139
Anti-D→ATD	-0.07^{ns}	0.07	-0.14^{ns}	0.09	0.302	1	0.582
Pro-D→PDNs	0.83***	0.05	0.75***	0.05	0.000	1	0.992
Anti-D→PDNs	-0.35***	0.09	-0.31**	0.10	1.797	1	0.180
Pro-D→PBC	**-0.76*** **	**0.05**	**-0.58*** **	**0.07**	**8.288**	**1**	**0.004**
Anti-D→PBC	0.34***	0.09	0.41***	0.10	0.514	1	0.473

Note: Chi-square difference values obtained from Mplus DIFFTEST function. Statistically significant difference path across sexes is shown in bold. ATD = attitudes toward drinking; PDNs = perceived drinking norms; PBC = perceived behavioral control; DI = drinking intention; Pro-D = pro-drinking exposure; Anti-D = anti-drinking exposure. ^{ns} = non-statistically significant, * = p <.05, ** = p <.01, *** = p <.001

Table 4.4: Sex comparison in mediation effects

Pathways	Male Model			Female Model		
	Indirect effect	95% C.I.	Interpretation	Indirect effect	95% C.I.	Interpretation
Pro-D→ATD→DI	0.03^{ns}	-0.049, 0.107	Not mediated	-0.01^{ns}	-0.140, 0.115	Not mediated
Anti-D→ATD→DI	-0.00^{ns}	-0.012, 0.006	Not mediated	0.00^{ns}	-0.023, 0.027	Not mediated
Pro-D→PDNs→DI	0.26*	0.038, 0.475	Partially mediated	0.25**	0.016, 0.420	Partially mediated
Anti-D→PDNs→DI	-0.11*	-0.216, -0.003	Fully mediated	-0.10*	-0.186, -0.021	Fully mediated
Pro-D→PBC→DI	0.16*	0.034, 0.289	Partially mediated	0.17**	0.069, 0.273	Partially mediated
Anti-D→PBC→DI	-0.07*	-0.142, -0.004	Fully mediated	-0.12**	-0.206, -0.037	Fully mediated

Note: Standardized path coefficients for indirect effects obtained from Mplus IND function. ATD = attitudes toward drinking; PDNs = perceived drinking norms; PBC = perceived behavioral control; DI = drinking intention; Pro-D = pro-drinking exposure; Anti-D = anti-drinking exposure. ^{ns} = non-statistically significant, * = p <.05, ** = p <.01

Discussion

This study examined how alcohol-related media exposures as an environmental factor contributed to rural Thai adolescent drinking intention. It also assessed whether psychosocial factors of the TPB mediated the relationship between alcohol-related media exposures and drinking intention and whether these associations/mediations varied by their biological sex. Little empirical research has been done thus far to investigate the impact of contextual factors that predict and modify adolescents' drinking intention, an essential predictor for adolescents' alcohol consumption. In contrast with prior findings suggesting a sex difference in contextual influences (females greater than males) (Chen et al., 2017; Mundt, 2011; Jones & Magee, 2019), our findings did not support variation between biological sexes. For the most part, the path coefficients and mediation effects were fairly similar between male and female subgroups. The only significantly different association between males and females was the impact of pro-drinking exposure on adolescents' perceived control, with a significantly higher impact for males. This finding may be a result of increasing game- and sport-related alcohol advertisements that appear more frequently in media targeting male audiences (Kaewpramkusol et al., 2019; Pongutta et al., 2019). Such advertisements often portray drinking as a male trait associated with success, leadership, or masculinity (Kaewpramkusol et al., 2019; Waleewong, 2019). In rural communities, alcohol consumption is pleasurable and viewed as a culturally acceptable behavior for adolescent males (Detpitukyon et al., 2018; Glomjai, 2015). Thus, rural Thai adolescent males may perceive greater societal acceptance for drinking, which could subsequently impair their capacity to control consumption of alcoholic beverages. Finally, with the increased need for virtual socialization during the COVID pandemic (Nagata et al., 2022; Widyastari et al., 2022), adolescents may have been exposed to a greater number of pro-drinking messages that were

embedded in their online learning platforms. It is important to mention that our data collection period occurred from March to May 2022, when the majority of Thai schools had recently returned from nearly a year of online learning.

Our results support the possibility of utilizing PBC to buffer the negative influences of alcohol-related media exposure and decrease rural Thai adolescents' drinking intention. For example, PBC emerged as a significant psychosocial factor that can buffer the impact of alcohol-related media exposures, particularly for adolescent females (β_{female} = -0.30, p = .001 vs β_{male} = -0.21, p = .015). The fact that exposure to anti-drinking messages significantly increased adolescents' perceived behavioral control toward drinking for both males and females is encouraging. Therefore, the possibility exists that increasing adolescents' exposures to anti-drinking messages may improve their PBC and minimize their drinking intention. With limited understanding of the impact of anti-drinking message exposure, this finding is noteworthy. Although attention to anti-drinking messages did not directly predict adolescents' drinking intention, its association with drinking intention was significantly mediated by adolescents' PDNs and PBC for both males and females. This lack of a direct effect on drinking intention may be because of a lower volume of anti-drinking messages available in social media in Thailand. Unlike pro-drinking messages, anti-drinking messages are usually produced by health-related organizations and are typically broadcast on television and seen on other traditional media such as billboards and magazines (Ho et al., 2014; Kaewpramkusol, 2018). With limited anti-drinking messages available on popular Thai social media platforms (Waleewong, 2019), it is difficult to observe its significant direct effects. Our findings signify the need for the Thai government and relevant organizations to create more appealing anti-drinking messages for dissemination in popular social networks for adolescents to buffer the detrimental effects of excessive pro-

drinking messages and advertising.

Similar to our previous findings (Kantawong et al., 2022), adolescents' PDN also emerged as the strongest predictor of drinking intention, even after adding exposure to alcohol-related media. This finding indicates that for Thai adolescents living in rural areas, what others do or act with regard to drinking has an influence on their perceived drinking norms and can subsequently impact their drinking intention. To translate this finding and develop meaningful norms-based interventions, targeting and reshaping positive drinking norms at the family, school, and societal levels is necessary. In addition, given its significant role as a mediator, PDNs can be targeted to buffer the negative impact of pro-drinking media exposure.

Our findings seem to suggest a drinking culture shift for rural Thai adolescent females. In this study, the prevalence of "*drinker"* status was fairly comparable between sexes. Prior to this study, however, sex inequality in drinking norms had been suggested because of patriarchal beliefs rooted in rural Thai culture (Glomjai, 2015). In rural, conservative culture, socializing and drinking with friends is viewed as a moral failing and can be further stigmatized for females as a low-class behavior (Detpetukyon et al., 2018; Hanpatchaiyakul et al., 2017). Consequently, the prevalence of alcohol drinking was persistently lower in adolescent females (Assanangkornchai et al., 2018; Hongthong et al., 2013; Paileeklee et al., 2016). Our contradictory findings may be the result of females' increased exposure to pro-drinking messages in various online platforms particularly during the COVID pandemic. This contention is supported by the greater proportion of alcohol-related posts that females received from their social networking friends in the past month (71.37% vs. 67.08%) and increased time spent on social media (≥3 hours/day) as compared to males (75.21 % vs. 67.51%). As documented in various prior studies, pro-drinking messages shared in popular social media sites are more likely

to portray drinking as a positive depiction, which may boost adolescents' drinking intention and endorse alcohol drinking behaviors (Kantawong et al., 2021). Future interventions that attempt to counter the detrimental impacts of pro-drinking media should consider biological sex and cultural influences. In addition, our findings highlight the need for Thai policymakers and other health and education organizations to tackle the impacts of alcohol-related social media and growing advertisements intended for female audiences.

To our knowledge, this study is the first to examine adolescents' drinking intention within the context of ecology systems simultaneously. Together, we investigated how rural Thai adolescents' drinking intention at the micro-level is influenced by their perceived drinking norms at the exo-system level and alcohol-related media exposures at macro-system level. This ecological approach is helpful for researchers to understand how rural Thai adolescents' drinking intention is shaped within their environmental context, where drinking norms are more acceptive than elsewhere. This approach has extensively enhanced the capability of the TPB to capture adolescents' conscious plan for alcohol consumption. As a result, our findings demonstrated the higher proportion of variance explained in adolescents' drinking intention (82% vs 36–67%), extending beyond previous TPB-based studies that did not include consideration of the broader environment (Cook et al., 2016; Cutrín et al., 2020; Kyrrestad et al., 2020). Our findings support the notion that adolescents' decision to drink alcoholic beverages is rooted in their interactions with multilevel systems (Bergagna & Tartaglia, 2019; Kantawong et al., 2021; Marino et al., 2020). Thus, environmental influences should be considered when developing programs to improve adolescents' drinking intentions and behaviors.

Limitations and Future Directions

The current study had some limitations. It employed a cross-sectional survey design with

self-reported data. Future studies should employ a longitudinal design to understand the underlying mechanisms that contribute to rural Thai adolescents' drinking intention and their actual behaviors. Given the subjectivity of self-reported data on a sensitive topic like alcohol use during adolescence, social desirability bias is a possibility (Gnambs & Kaspar, 2015; Zhang et al., 2017). In addition, only biological sex was treated as a moderator in the current study; other potential personal and environmental moderators were not investigated. Future research should explore other potential moderators, including adolescents' media literacy, the duration and pattern of media exposures, and other protective family factors.

Summary and Implications

The current study elucidates the mechanism linking alcohol-related media exposure and adolescents' drinking intention. The findings advance existing knowledge regarding the function of environmental influences in the interplay between interpersonal and contextual factors that influence adolescents' intention to drink alcohol in the near and distant future. This study has underscored the strong association between adolescents' pro-drinking message exposure and their drinking intention, with its significant indirect effects through PDN and PBC in both males and females. Therefore, a need exists to reshape adolescents' perceived drinking norms by improving adolescents' media literacy skills (ability to wisely access and analyze media messages). It is possible for future prevention programs to facilitate adolescents' capability in discerning pro- and anti-drinking messages in media and buffer the negative impact of pro-drinking message exposures. This effort can eventually improve their perceived behavioral control in alcoholic beverage consumption. Although adolescents' anti-drinking media exposures were not directly linked with their drinking intention, their association with drinking intention was significantly partially and fully mediated by PDN and PBC, respectively. Thus, it is critical

to highlight the need for policy makers and relevant organizations in Thailand to develop more attractive anti-drinking messages which could buffer the negative impacts of pro-drinking messages. In addition, multi-level interventions (family, school, and societal levels) that incorporate peer and family support to reshape PDN and enhance PBC are recommended to mitigate pro-drinking media exposure at the larger societal level.

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APPENDIX A: MEASUREMENT MODEL RESULTS

Supplemental Table 4.1: Estimates of measurement model

Variables	Items	Factor loading	SE	AVE	CR
Pro-drinking exposure	Pro-O1	0.83	0.02	0.71	0.93
Own attention (Pro-O)	Pro-O2	0.93	0.02		
	Pro-O3	0.85	0.02		
	Pro-O4	0.77	0.03		
	Pro-O5	0.84	0.02		
Peer attention (Pro-P)	Pro-P1	0.81	0.03	0.72	0.90
	Pro-P2	0.89	0.02		
Anti-drinking exposure	Anti-O1	0.84	0.02	0.67	0.91
Own attention (Anti-O)	Anti-O2	0.90	0.01		
	Anti-O3	0.90	0.01		
	Anti-O4	0.67	0.03		
	Anti-O5	0.77	0.02		
Peer attention (Anti-P)	Anti-P1	0.81	0.04	0.72	0.90
	Anti-P2	0.89	0.04		
Attitude toward drinking	ATD1	0.77	0.03	0.65	0.90
	ATD2	0.80	0.03		
	ATD3	0.86	0.02		
	ATD4	0.85	0.02		
	ATD5	0.74	0.03		
Perceived drinking norms	DN1	0.84	0.04	0.44	0.75
Descriptive norm (DN)	DN2	0.62	0.04		
	DN3	0.61	0.04		
	DN4	0.54	0.05		

Supplemental Table 4.1 (cont'd)

Variables	Items	Factor loading	SE	AVE	CR
Subjective norm (SN)	SN1	0.82	0.02	0.69	0.92
	SN2	0.86	0.02		
	SN3	0.79	0.02		
	SN4	0.89	0.02		
	SN5	0.80	0.03		
Injunctive norm (IN)	IN1	0.75	0.03	0.62	0.89
	IN2	0.82	0.03		
	IN3	0.71	0.03		
	IN4	0.86	0.03		
	IN5	0.81	0.03		
Perceived behavioral control	CBS1	0.80	0.02	0.69	0.94
Control belief strength	CBS2	0.85	0.02		
(CBS)	CBS3	0.81	0.02		
	CBS4	0.84	0.02		
	CBS5	0.86	0.02		
	CBS6	0.86	0.02		
	CBS7	0.82	0.02		
Control belief power	CBP1	0.77	0.03	0.69	0.94
(CBP)	CBP2	0.88	0.02		
	CBP3	0.92	0.01		
	CBP4	0.80	0.02		
	CBP5	0.80	0.02		
	CBP6	0.86	0.02		
	CBP7	0.80	0.02		

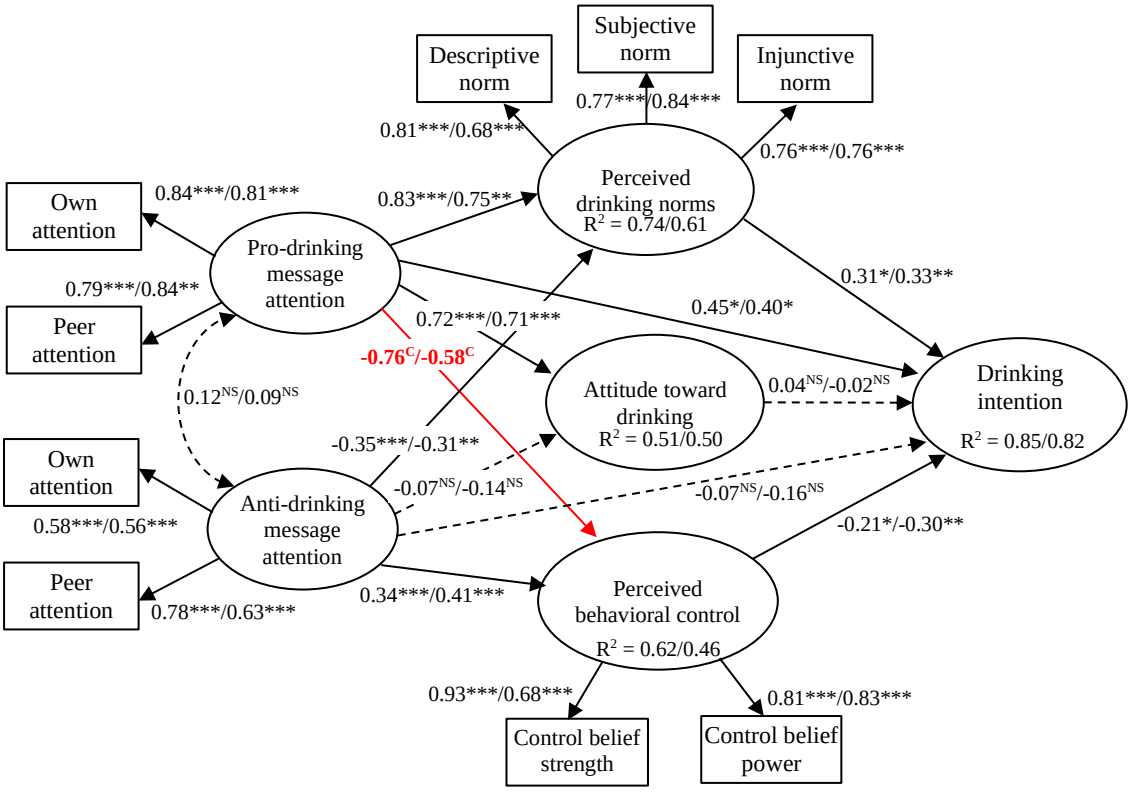
Supplemental Table 4.1 (cont'd)

Variables	Items	Factor loading	SE	AVE	CR
Drinking intention (DI)	DI1	0.79	0.02	0.77	0.94
	DI2	0.86	0.02		
	DI3	0.93	0.01		
	DI4	0.90	0.02		
	DI5	0.89	0.02		

Note: All standardized factor loadings (λ) are significant at $p < .001$. SE = standard error; AVE = average variance extracted; CR = composite reliability.

APPENDIX B: SEX COMPARISON MODEL

Supplemental Figure 4.1: The comparison model between male and female groups



Note: The standardized path coefficients and R^2 are presented in male/female. Dotted line represented non-statistically significant paths. The red font reflected the significant difference between males and females. The levels of significance in path-coefficients are indicated as * = p <.05, ** = p <.01, *** = p <.001. ^{NS} indicated non-statistically significant path.

CHAPTER 5: DISCUSSION AND CONCLUSIONS

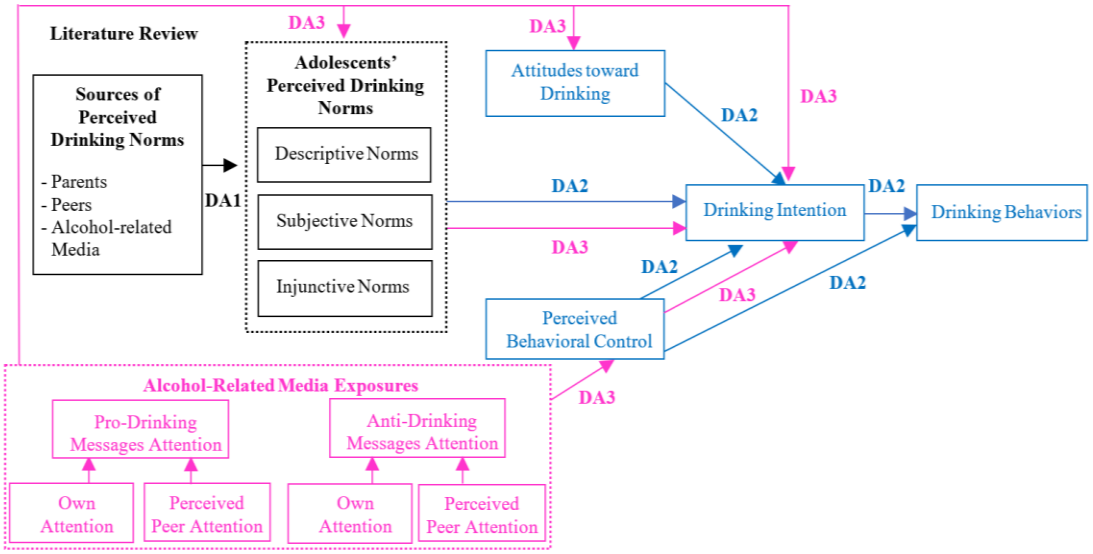
The goal of this dissertation was to advance the state of science by explicitly examining the conceptual and theoretical underpinnings of adolescent drinking intention and behaviors within the rural Thai context. A multiple manuscript approach was employed to address three specific dissertation aims to be covered in three chapters. In particular, Chapter 2 updated the state of the science by clarifying how adolescents' perceived drinking norms was conceptualized and operationalized in the existing literature, particularly with regard to how subjective norms and descriptive norms influenced their drinking intention and behaviors (Manuscript 1, published in the *Western Journal of Nursing Research*). Building on this fundamental work, Chapter 3 expanded and operationalized a broader definition of perceived drinking norms and examined the influence of psychosocial factors of the Theory Planned Behavior (TPB) on rural Thai adolescents' drinking intention and behaviors (Manuscript 2, submitted to the *Journal of Adolescent Health*). Finally, considering the impacts of social environment, Chapter 4 further operationalized our proposed model by examining the influence of alcohol-related media exposure on the TPB-based psychosocial factors and rural Thai adolescents' drinking intention (Manuscript 3 to be submitted to *Youth and Society*). The findings of this dissertation bridge an important knowledge gap about rural Thai adolescents' perceived drinking norms on their drinking intention and behaviors. This enhanced understanding provides valuable recommendations for nurse researchers and Thai policymakers to tackle the underage drinking problem among rural Thai adolescents.

Summary of Dissertation Aims

Figure 5.1 illustrates how the three dissertation aims were examined and hypothesized. More specifically, Dissertation Aim 1 (DA 1) evaluated the state of the science on adolescents'

perceived drinking norms toward alcohol misuse. This integrative literature review reinforced the need to expand the contextual operation of perceived drinking norms while investigating adolescents' drinking intention and behaviors. Dissertation Aim 2 (DA 2), therefore, was intended to counteract TPB's shortcoming in its restricted definition of normative beliefs regarding drinking. Subsequently, the subjective norms of the TPB were expanded in DA 2 to incorporate descriptive and injunctive norms perceived by rural Thai adolescents. This expanded exploration filled an important knowledge gap about how the TPB's psychosocial factors (particularly perceived drinking norms) may impact rural Thai adolescents' drinking intention and behaviors. Finally, based on the findings of DA 2, Dissertation Aim 3 (DA 3) advanced existing scientific knowledge by examining how alcohol-related media exposure may influence rural Thai adolescents' psychosocial factors of TPB and drinking intention; and how the relationship between alcohol-related media exposures and drinking intention were mediated by these adolescents' psychosocial factors. Finally, we explored how these associations may differ by biological sex.

Figure 5.1: Overview of the dissertation aims and hypothesized associations



Note: DA represents dissertation aim

Dissertation Aim 1 (DA 1): Evaluate the state of science on adolescents' perceived drinking norms toward alcohol misuse.

Since there is little understanding about how adolescents' perceived drinking norms may affect their drinking intention and early drinking onset, an integrative literature review was conducted, which was subsequently published in the Western Journal of Nursing Research. This work was designed to provide an update on the evidence of how subjective and descriptive norms influence adolescents' perceptions toward drinking intention, and behaviors. The results demonstrated that adolescents' drinking intention and behaviors (i.e., drinking onset and patterns) were highly correlated with their perceived drinking norms derived from parents, peers, and exposure to pro-drinking messages (Kantawong et al., 2021).

The results of this integrative review informed two knowledge gaps 1) the impact of alcohol-related media exposure on adolescents' drinking intention and patterns are unclear, and 2) there is a need to expand the scope of domains contributing to adolescents perceived drinking norms. For example, the finding of this integrative review confirmed that adolescents' drinking norms may be derived from online interactions at social networking sites (SNS) (e.g., Facebook, Instagram, and Twitter) and/or other electronic media platforms filled with pro-drinking messages/postings. Research has shown that these types of media exposures were highly correlated with adolescents' intention to drink early (Morgenstern et al., 2017; Mundt, 2011) and worsened drinking patterns (Brunborg et al., 2017; Chen et al., 2016; Morgenstern et al., 2017). Similarly, adolescents' paying attention to pro-drinking postings on SNS at an early age may be associated with adolescents' increased drinking intention and subsequent earlier onset of drinking and/or problematic drinking behaviors (Nesi et al., 2017).

In addition to the above two knowledge gaps, the magnitude of influences derived from pro-drinking media exposures on adolescents' drinking intention remain unclear, however, these associations differed between adolescent males and females. For example, some studies found a stronger relationship between female adolescents' alcohol-related media exposure and their drinking intention than for their male counterparts (Aiken et al., 2018; Morgenstern et al., 2017; Mundt, 2011). Other studies, however, reported that male adolescents' favorable attitudes toward drinking and their intention to initiate drinking were more likely to be influenced by alcohol-related media exposures as compared to adolescent females (Cavazos et al., 2015; Chen et al., 2017; de Bruijn et al., 2016). It remains unclear how the associations between media exposures, psychosocial factors, and drinking intention may differ by adolescents' biological sex. Therefore, further investigation of how alcohol-related media exposures may influence adolescents' perceived drinking norms and their drinking intention and how this influence may differ between biological sexes is warranted (Kantawong et al., 2021).

In short, as distinct from previous reviews, this review confirmed that the normative beliefs regarding drinking (perceived drinking norms) for adolescents growing up in today's digital era are shaped differently than those of adolescents in previous decades (Kantawong et al., 2021; Rimal & Lapinski, 2015). The digital world offers various socialization platforms with their online peers (Alhabash et al., 2020; Roberson et al., 2018). Thus, adolescents' perceptions regarding drinking should be considered within the larger societal context. In another words, the subjective norms of the TPB, in which adolescents' perceived drinking norms are strictly derived only from parents and peers, may not be sufficient for considering how today's adolescents form norms (Cox & Bates, 2011; Kantawong et al., 2021; Rimal & Lapinski, 2015). Therefore, a broader consideration of perceived drinking norms for modern adolescents is needed when

examining factors that contribute to adolescents' drinking intention and behaviors.

Dissertation Aim 2 (DA 2): Examine the role of psychosocial factors and biological sex on rural Thai adolescents' drinking intention and behaviors.

In this chapter, a broader aspect of adolescents' perceived drinking norms (including descriptive, subjective, and injunctive norms) was operationalized to better understand how psychosocial factors of the TPB may influence adolescents' drinking intention and behaviors (drinking onset, current drinking pattern, binge drinking pattern). In addition, the roles of adolescents' personal sociodemographic and parental factors were explored by treating them as the potential confounders. This exploration was designed to enhance our understanding of whether those adolescents' sociodemographic factors differed in their associations with rural Thai adolescents' drinking status. A hypothesized structural model was proposed and tested to see how well our proposed model fit the data. Finally, we tested a comparison model to understand the differences in path coefficients within our final parsimonious model between adolescent males and females. This comparison model was designed to evaluate if there are differences in those associations (i.e., magnitude and significance) between adolescent males and females.

The results from univariate analysis, assessed by Pearson's test ($p < 0.05$), confirmed that adolescents' premature drinking status (drinkers and nondrinkers) were significantly associated with sociodemographic factors including adolescent age ($\chi^2 = 6.82$, $p < .05$), grade level ($\chi^2 = 9.27$, $p < .05$), parent educational level ($\chi^2 = 10.80$, $p < .05$) and parental drinking status ($\chi^2 = 35.00$, $p < .001$), while adolescents' biological sex, grade point average (GPAs), religion, parent marital status, and monthly household income were not.

Our final structural equation modeling analysis demonstrated that adolescents' perceived

drinking norms (PDNs) was the strongest predictor of adolescents' drinking intention, followed by PBC; this pattern of prediction appears to remain consistent for both male and female models. While drinking attitude emerged as a weaker but significant predictor of drinking intention for adolescent females, it was found to be insignificant among adolescent males. However, its path coefficients differed significantly across male and female subgroups ($\Delta \chi^2 = 3.554$, $p < .05$). Although the significant differences were not supported for other pathways, a slightly higher magnitude of the association between PDNs and drinking intention was detected for males than females. In contrast to what the TPB proposed, this study found that adolescents' PBC only had a significant direct effect on their drinking onset, but not on their current and binge drinking behavior. Importantly, higher drinking intention was significantly correlated with an earlier drinking onset, higher frequency of current drinking, and binge drinking behaviors.

The findings provided support for the utility of the TPB for understanding rural Thai adolescents' drinking intention and behaviors. As a result, the final structural model explained as much as 84% of the variance in drinking intention, 37% of the variance in drinking onset, as well as 18% of the variance in *current* drinking behavior and 10% in *binge* drinking behavior. These results were higher than of other TPB-based studies which typically accounted around 36–67% of variance in drinking intention and behaviors (Cook et al., 2016; McEachan et al., 2011). Moreover, in our study, drinking intention partially mediated the association between PDNs and binge drinking behavior, as well as the association between PBC and drinking onset. Adolescents' drinking intention, however, fully mediated the associations between adolescents' drinking attitude and all drinking behavioral outcomes.

In brief, the greater variance explained by our model suggests that the TPB framework with the extended construct of perceived drinking norms explained rural Thai adolescents'

drinking intention and behaviors very well. In addition, the results highlighted the paradigm shift from concentrating on adolescents' drinking attitudes (Cook et al., 2014; Lac et al., 2013; Phuphaibul et al., 2011) to focusing on their perceived drinking norms in order to delay their drinking onset and problem drinking behaviors (e.g., binge drinking). This study critically addressed an important knowledge gap by proving that a greater degree of drinking intention among adolescents highly predicted their earlier onset of drinking. Finally, these findings lay the support for norms-based interventions in which manipulating adolescents' perceived norms on drinking and their PBC would likely decrease their drinking intention, hence postponing drinking onset and reducing problem drinking behaviors.

Dissertation Aim 3 (DA3): Examine the role of alcohol-related media exposure on rural Thai rural Thai adolescents' drinking intention.

Although adolescents' attention to pro- and anti-drinking messages have been noted as potential environmental factors associated with adolescents' drinking intention (Ho et al., 2014; Scribner et al., 2011; Scull et al., 2014), the influence of alcohol-related media exposure on rural Thai adolescents' drinking intention is not clear, as well as how these associations are mediated by various psychosocial factors (PDNs, attitudes, and PBC) and moderated by their biological sex. Chapter 4 (Manuscript 3) therefore incorporated an essential aspect of environmental influence, as delineated in the Ecological Model (Bronfenbrenner, 1994; Bronfenbrenner & Morris, 2006), by adding alcohol-related media exposure (pro- and anti-drinking message attention) to our conceptual model, to address this knowledge gap. In this chapter, we tested how well our revised hypothesized model fit our collected data.

Compared to anti-drinking message exposures, our final structural model indicated that pro-drinking message exposures had a significantly greater impact on adolescents' psychosocial

factors (PDNs, attitudes, and PBC), which, in turn, contributed to their drinking intention. The results from mediation analysis revealed that the associations between pro-drinking message exposure and drinking intention was partially mediated by adolescents' PDNs and PBC, while the relationship between anti-drinking message exposure and drinking intention was fully mediated by PDN and PBC in both male and female models. Although the mediation effects between male and female subgroups were comparable, the effect of pro-drinking message exposure on adolescents' PBC was significantly stronger for males, suggesting that adolescent males appear to be more susceptible to the negative impact of pro-drinking messages. This study supports the notion that adolescents living in areas where males' drinking behavior is perceived as more pleasurable will have a more favorable perception of societal approval regarding drinking (PDNs), and that this privileged perception may eventually impede their ability to exert control over their drinking (PBC). Consequently, future interventions that aim to minimize the effect of alcohol-related media exposure on rural Thai adolescents' drinking intention and behaviors should consider this result.

Overall, the findings provide a substantial scientific addition to the existing literature by identifying the influence of pro-drinking messages embedded in online platforms on rural Thai adolescents' drinking intention. This work also offers some potential actions for Thai policymakers for developing effective strategies to mitigate the detrimental impacts of pro-drinking messages, which is now widespread on numerous online platforms. In addition, raising adolescents' attention to anti-drinking messages through more prominent online platforms could further offset the negative impact of pro-drinking message exposure. In conclusion, the findings underscore the need to enhance adolescents' media literacy and strengthen their ability to minimize the negative influence of pro-drinking messages that are extensively disseminated

across several online platforms. This solution may be useful for reducing rural Thai adolescents' drinking intention and, eventually, problem drinking behaviors.

Limitations of the Overall Dissertation

As with all research, there are some limitations of this study. The review methods described in Chapter 2 (Manuscript 1) may have restricted the findings. First, because the review contained only English-language articles, relevant studies published in other languages may have been overlooked. Second, due to the vastness and variety of their definition and measurements of perceived drinking norms (descriptive or subjective) as well as their measurement of alcohol use, this may limit the ability to synthesize the findings. Finally, the majority of included studies were conducted in the United States (k =13), limiting the generalizability of the findings. This is because different countries may have distinct cultures, social conventions, and regulations on underage drinking, which may differently impact adolescents' descriptive norms toward drinking.

For Chapter 3 (Manuscript 2), first, because of the nature of cross-sectional study design (Burns & Grove, 2009), it is difficult to draw a causal relationship. A longitudinal study is needed to verify the relationship between behavioral intention and actual drinking behaviors (Bhochhibhoya & Branscum, 2018; Caudwell et al., 2015). Second, self-reported responses to questions on alcohol consumption may generate biased results (Khalili et al., 2021; Livingston et al., 2016), potentially resulting in underreporting due to social desirability bias. Third, only biological sex was considered and included as a potential moderator; in future analyses, it will be important to consider additional potential confounding variables, such as school settings and family factors (e.g., parents-child communication regarding underage drinking, parental monitoring, and parent drinking status). Finally, due to the specific sample of only rural Thai

adolescents in this study, these finding may not be generalizable to other regions in Thailand as well as other countries.

For Chapter 4 (Manuscript 3), our findings may have limited generalizability given that different countries may have differences in regulations on alcohol-related advertisements. In addition, recall bias may exist, given the nature of asking adolescents to recall their exposures to anti-drinking and/or pro-drinking messages collectively from five different media sources. Future studies should attempt to delineate the different impacts derived from attention paid to different media sources. Lastly, not all potential moderators were explored. Future studies should consider the influences of adolescents' media literacy, the patterns and intensity of alcohol-related media exposures, and other relevant family factors.

Implications of Overall Dissertation

Despite these limitations, this dissertation has several implications for nursing research, nursing education, nursing practice, and policy and society.

Nursing Research

This unique work highlights the need for incorporating a board perspective when examining adolescents' perceived drinking norms among the latest generation of adolescents who live in a media-rich environment (Kantawong et al., 2021). It is recommended that nurse researchers who specialize in prevention of underage drinking or in health promotion widen the scope of individuals' perceived social norms related to specific behaviors to include descriptive and injunctive norms. This can assist nurses to obtain a broader understanding of how complex societal systems influence individuals' intentions and behaviors. (Kantawong et al., 2021; Rimal & Lapinski, 2015). Although our model explains a great amount of the variance in rural Thai adolescents' drinking intention and behaviors, it remains unclear whether our proposed model

would generate similar results when used with different populations, such as adolescents living in other regions in Thailand and/or other Asian adolescents who share similar cultural beliefs. Through these explorations, nurse researchers can make a critical contribution to the science beyond this work by examining whether adolescents' drinking intention and behaviors vary depending on the quantity of online drinking peers and/or the frequency of pro-drinking message exposure.

This work also has an impact on nursing research by highlighting the significant role of adolescents' perceived drinking norms and perceived behavioral control. Nurse interventionists can manipulate these variables while attempting to reduce rural Thai adolescents' drinking intention and behaviors as well as delay their drinking onset. Our finding endorses the possibility of developing norm-based drinking prevention programs that include strengthening adolescents' media literacy skills. As highlighted in previous meta-analyses, media literacy skill training programs had a modest effect size (d = 0.28-0.37) in decreasing adolescents' deviant behaviors, including alcohol drinking (Jeong et al., 2012; Vahedi et al., 2018; Xie et al., 2019). Incorporating persuasive media tactics discussion, evaluating sample messages critically, and even creating messages can assist adolescents in being more conscious of the nature of messages and proficient at understanding their motivations and goals (Banerjee et al., 2015; Greene et al., 2020). Beyond this point, nurse interventionists are urged to develop multi-level interventions incorporating peer, family, and/or school support to modify adolescents' deviated drinking norms and boost their ability to regulate their drinking impulse (PBC) (Slade et al., 2021; Vallentin-Holbech et al., 2019). Adolescents with improved perceived drinking norms and perceived behavioral control would be more likely to withstand peer pressure and buffer the negative impact of pro-drinking media exposures.

Nursing Education

The knowledge gained from this dissertation can be employed to promote excellence in nursing education by equipping the future nursing workforce with competence to promote well-being among vulnerable populations across both national and global contexts. These findings can be incorporated into training programs for undergraduate and graduate nurses in Thailand, concentrating on underage drinking prevention as well as prevention of other health risk behaviors, with a focus on the importance of broader societal aspects underlying underage drinking behaviors that need to be considered when promoting healthy behaviors among rural Thai adolescents as they transition into adulthood.

Furthermore, the new generation of nurses should possess up-to-date knowledge of how to best support healthy behaviors across the lifespan because of the proliferation of new technologies and online platforms. Thai nurses will require additional knowledge ensuring they are adequately prepared to promote healthy behaviors in an environment that includes a digital world. This training may include specific information pertaining to the roles of nurse practitioners and school nurses, such as the skills needed when designing interventions to delay adolescents' drinking onset and reduce hazardous drinking behaviors such as how to include multi-level prevention programs and incorporation of media literacy training skills.

Nursing Practice

Nursing practice can be impacted by this novel study identifying perceived drinking norms (PDNs) and perceived behavioral control (PBC) as crucial components for future interventions aiming at underage drinking prevention. Modifying rural Thai adolescents' harmful drinking norms and enhancing their capacity to buffer peer and social drinking pressures could diminish their drinking intention, thereby delaying their drinking onset and reducing other

problem drinking behaviors. These findings also highlight the significance of understanding the role of pro-drinking message exposures as environmental influences in the interaction between interpersonal and contextual factors that could influence rural Thai adolescents' intention to drink alcohol. Thai school nurses and nurse practitioners should aim to reshape adolescents' perceptions of drinking norms by improving their media literacy skills related to consumption of digital media (ability to access, analyze, and interpreting media messages/contents), as a means to mitigating the harmful effects of pro-drinking message exposures. This might ultimately increase rural Thai adolescents' belief of their behavioral control over alcohol drinking. Finally, our findings noted that parental factors (education level and drinking status) were significantly associated with adolescents' early drinking onset. Likewise, in rural Thai culture, the family is the primary social unit, and adolescents are highly respectful and attentive to their parents (Miller et al., 2012). Thus, incorporating parental factors into the underage drinking prevention efforts is needed particularly enhance parents' education regarding detrimental consequences of underage drinking. Furthermore, additional parental training about positive communication and monitoring techniques can potentially mitigate their drinking intention and behaviors (Das et al., 2016; Urbaeva et al., 2017).

Policy and Society

This dissertation highlights the urgent need for Thai policymakers and other health-related institutions to postpone the onset of drinking, which might eventually reduce problematic drinking behaviors among rural Thai adolescents in the future. Importantly, the results of this dissertation corroborated that current alcohol-related regulations and policies in Thailand are inadequate if the objective is to protect youth from pro-drinking advertising, since this lack of regulation permits advertisers to influence the drinking intention of those under age 20 in

Thailand, this is the age when alcoholic beverages can legally be sold. This conclusion reinforces the necessity for policymakers and relevant organizations in Thailand to update alcohol-related legislation governing alcohol promotion, particularly on various online platforms, especially popular social networking sites such as Facebook, Instagram, TikTok, and YouTube. The development of more appealing anti-drinking campaigns that might mitigate the detrimental effects of pro-drinking messaging also is warranted.

Conclusion

Overall, this work offers a broader view for determining adolescents' beliefs regarding alcohol drinking (perceived drinking norms), since it considers the complex aspects of various societal levels that often are overlooked. In addition, this dissertation contributes to the science by identifying the paradigm shift needed to focus on adolescents' perceived drinking norms rather than solely on drinking attitudes in order to minimize rural Thai adolescents' drinking intention and behaviors. Importantly, this dissertation advances nursing knowledge by verifying the predictability of adolescents' drinking intention on their drinking onset, which is essential knowledge needed for nurse scientists since earlier drinking onset during adolescence is a risk factor for future alcohol abuse during adulthood (Assanangkornchai & Vichitkunakorn, 2020; Phuphaibul et al., 2011). Our findings signify the importance of postponing the onset of drinking among rural Thai adolescents. This novel insight enables nursing researchers and educators in Thailand to address underage drinking as an early detection strategy before adolescents begin alcohol use.

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