Testing a mediation model of psychological distress, drug abuse, self-control, problem gambling, and alcohol use among young adults

ABSTRACT

The aim of this study is to examine the relationship between psychological distress (PD) and Alcohol use (AU), and the mediating effects on such association. A cross-sectional study was conducted using a school-based online survey. The main variables are PD, AU, self-control (SC), problem gambling (PG), and drug abuse (DA). The study consisted of 1,538 students, aged 15 to 23 years. Data were analysed using descriptive statistics, correlation and a parallel multiple mediation. In the total sample, the prevalence of AU associated with a low risk was 58.3% and that associated with a high risk was 12.0%. The prevalence of PD was 39.8%. There is a positive association between PD and AU. DA and PG were found to significantly mediate the association between PD and AU, such that higher levels of PD were associated with greater DA and PG which were associated with higher AU. Contrary to the hypothesis, SC was not found to mediate this relationship. The findings support the existing literature suggesting that AU-related PG and DA mediated the relationship between PD and AU. These findings signify the utility of targeting DA and PG in programs designed to prevent and reduce AU among young adults who experience PD.

KEY WORDS: Alcohol use, Psychology distress, Self-control, Problem gambling, Drug abuse

INTRODUCTION

Alcohol use (AU): Alcohol as an intoxicant is a causal factor in more than 200 diseases, presenting a major public health concern (World Health Organization, 2023). It affects a wide range of structures and processes in the central nervous system and increases the risk for intentional and unintentional injuries and adverse social consequences (Thurm et al., 2022). Globally, AU contributes to 3 million deaths each year and harmful use of alcohol is responsible for 5.1% of the global burden of disease (World Health Organization, 2023). With growing awareness of the impact of AU on global health, the demand for research related to its mental and social consequences, particularly in the younger age group, has increased significantly in recent years.

Young adults (15 to 24 years old) are in a stage of development where harmful behaviours, such as alcohol consumption, start engaging (Jackson et al., 2002)(Grant et al., n.d.). It was discovered that those who began AU before the age of 17 had a significantly higher lifetime prevalence of alcohol dependence (24.5%) than those who began AU at age 21 or 22, which had a 10% lifetime prevalence, or at age 25 or older, which had a less than 4% lifetime prevalence (Grant et al., n.d.). Studies on young people have revealed that college students are more prone to engage in risky and maladaptive alcohol-related behaviour than their non-college peers (Blanco et al., 2008; Risi et al., 2019). In addition to the developing dependence, frequent AU and binge drinking often co-occur with other problem behaviours in college students such as academic problems, psychological distress, use of other substances and other delinquent behaviours (e.g., injuries, HIV/sexual risks) which may pose significant challenges to making a successful transition from adolescence to adulthood (Ellickson et al., 2003; Font-Ribera et al., 2013; Schulenberg & Maggs, 2002).

Psychological distress (PD): PD is an emotional disturbance that may impact on the social functioning and day-to-day living of individuals (Wheaton, 2007). Clinically, PD is defined as an emotional state of suffering characterized by symptoms of anxiety and depression (Lundin et al., 2016). College students frequently experience PD, according to studies (Bayram & Bilgel, 2008; Furr et al., 2001).

The association between AU and PD: Previous literature highlighted that there is an association between AU and PD (Steele & Josephs, 1988). In particular, PD among college students is associated to more severe AU, as well as increased alcohol-related problems (Armeli et al., 2010; Gonzalez et al., 2011; Sullivan et al., 2005). Such association is more significant in young adults (Balogun et al., 2014; Hahm et al., 2022; Lechner et al., 2020; Piumatti et al., 2019; Ruiz et al., 2020; Turk & Smith, 2017), specifically those attending educational institutions given their concurrent higher exposure to risks of PD and substance use (including alcohol) in comparison with those not attending educational institutions (Bartoli et al., 2014; Blanco et al., 2008; Villwock et al., 2016). In addition, PD together with AU in students often lead to low subjective well-being by interfering with the development of adequate self-control and coping strategies in academic contexts (Hunt & Eisenberg, 2010; Karam et al., n.d.).

Given the evidence of association between AU and PD, studies suggest that both AU and PD risk variables may be influenced by similar mechanisms (Risi et al., 2019; Steele & Josephs,

1988). For instance, both AU and PD may result from a malfunctioning brain mechanism (Grant et al., n.d.). On the other hand, some studies suggest that the association of PD and AU is a heterogeneous condition, predominantly due to high rates of co-morbid conditions, including substance abuse, and other personality and social disorders such as weakened self-control and problem gambling (Dowling et al., 2016; Knaebe et al., 2019; Lorains et al., 2011; Suomi et al., 2014a). However, little empirical work has addressed this hypothesis. A clear interpretation of such a relationship would help understand the nature of co-morbid associations (e.g., mediators) between these AU and PD and inform prevention and intervention strategies. Such potential mediators explored in this study are self-control, problem gambling, and drug abuse. This is contextually relevant because drug abuse, weakened self-control, and gambling are the top three presenting concerns among students seeking services at college counselling centres (Locke et al., 2012). In addition to this, these hypothesised mediators are well cited in the previous literature relating to AU and PD as co-occurring conditions (Balogun et al., 2014; Bell et al., 2022; Chang et al., 2022; Lechner et al., 2020; Maccombs-Hunter & Bhat, 2022; Ruiz et al., 2020).

Self-control (SC): SC refers to the ability to control one's impulses, cravings, desires, and habitual responses ("Supplemental Material for Ego Depletion and the Strength Model of Self-Control: A Meta-Analysis," 2010a). Despite the human capacity to regulate the self, many behavioural and social problems stem from persistent lapses of SC ("Supplemental Material for Ego Depletion and the Strength Model of Self-Control: A Meta-Analysis," 2010a). Studies have indicated that individuals who have weakened SC are more prone to negative behavioural and social consequences, for instance, AU and drug abuse (Baumeister et al., 2007; Mcquade & Gill, 2012). A study stated that PD can weaken SC, compromising the ability to successfully control emotions (Burns et al., 2010). This might be due to the fact that SC acts as a finite resource when stress causes a person's SC storage to be depleted, which subsequently impairs subsequent acts of SC. In contrast, some studies found that the SC was not significantly weakened in those with maladaptive behavioural and social problems (Stillman et al., 2017; "Supplemental Material for Ego Depletion and the Strength Model of Self-Control: A Meta-Analysis," 2010b). In the context of AU, weakened SC may make it more difficult for AU sufferers to manage their alcohol intake, frequency of drinking, and behaviour while intoxicated (Risi et al., 2019). A study has indicated that SC significantly mediates the association between AU and PD such that higher levels of PD were associated with lower SC, which in turn, was related to more alcohol.

Problem gambling (PG): PG in this study refers to a persistent maladaptive pattern of gambling characterised by difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community (Suomi et al., 2014b). Prevalence rates for PG have been estimated to be between 0.7 and 6.5% worldwide. (Calado & Griffiths, 2016). Several surveys have found the prevalence rates of problem gambling to be highest in young adults, resulting in multiple financial, mental, and social problems (Williams et al., 2006; Winters et al., 1998). One of the most notable concerns is that it can become more excessive when it is combined with AU suggesting that PG is more common among people with AU compared to those without AU (Grant et al., n.d.; Knaebe et al., 2019; Suomi et al., 2014a). One of the possible associations between PG and AU is that PG itself may promote the use of alcohol. For instance, if people are more likely to consume alcohol when gambling, it might infer that regular gambling raises the risk for AU. In addition to AU, growing evidence shows that PG tends to cluster with PD leading to poor quality of life (Carmen Messerlian1, n.d.; Ladd & Petry, 2003; Verdejo-García et al., 2008). A study acknowledged that comorbidity of PG is commonly associated with mood and anxiety disorders, along with engagement in crime to fund the gambling activity (Alex Blaszczynski1 & Lia Nower2, n.d.). Despite the previous literature, researchers cannot confidently state that problem gambling acts as a mediating factor between the association between AU and PD.

Drug abuse (DA): DA in adolescence is a serious health and social problem with its significant association with morbidity and mortality (Robert Milin and Selena Walker, 2016). The drugs (e.g., cocaine, heroin, barbiturates, and amphetamines) alter the function of the adolescent's brain and impact on behaviour for more risk-taking. The association of DA and PD is well established. In clinical and treatment studies of adolescent DA, elevated rates of comorbid mental health disorders (i.e., psychological distress and depression) have been found across clinical settings with prevalence rates ranging from 55% to 80% (Dennis et al., 2004; Sterling & Weisner, 2005). Previous research findings suggested that DA is also associated with AU in adolescence where adolescent drug abusers have an increased risk for AU (Alhadi Hasan, 2019; Kelly et al., 2015; Saing et al., 2020; Tian et al., 2021). Although research in adolescent DA has expanded significantly over time, there is little evidence on how DA plays a role in the relationship between AU and PD, underscoring the need for further research.

HYPOTHESIS

This study aims to extend the literature by investigating the mediating effect of SC, PG, and DA on the association between AU and PD among young adults. We anticipated to determine positive correlations among SC, PG, and DA, each with PD, as well as AU. Further, we expect that SC, PG, and DA will mediate the association between PD and AU.

METHODS

Study design

This study adopted a cross-sectional design using information from Bangkok Behavioural Surveillance Survey (BBSS), a school-based online survey of adolescents in Thailand. To investigate the relationship between PD, AU, PG, DA, and SC among young adults in Thailand, a mediation model comprising one main predictor variable (i.e., PD), three mediating variables (i.e., SC, PG and, DA), and one outcome variable (i.e., AU) was analysed.

Participants and procedures

A multi-stage stratified sampling was utilized by the BBSS to collect a representative sample of public-school students. The first stage involved selecting an area that included of six main areas. With proportional to size, the second stage included sampling of one or more schools from each of selected six areas. The third stage was the selection of students. This stage involved up to 150 students at the chosen schools. The study consisted of 1538 young adults (students) in 24 public high schools (student at grade 8 and 11), and 12 vocational schools (student at year 2) under the Ministry of Education, Thailand. The study was approval by the Mahidol University Review Board (Certificate of approval No: 2020/052 (B1)). Young adults (15 to 25 years of age) were invited to participate in the survey between January and February 2022 via URLs and QR codes issued by data collecting coordinators at schools. Participants were required to read a participant information and informed consent sheet before beginning the survey, which explained their right to remain anonymous and the amount of time needed for full participation. Participants were given unique ID codes to ensure confidentiality and prevent duplication.

Measures

Alcohol use (AU): The level of AU was determined by the Alcohol Use Disorders Identification Test for Consumption (AUDIT-C) score, a self-report indicator of alcohol abuse that evaluates consumption, dependence, and harm (Higgins-Biddle & Babor, 2018). The questions contributing to the scoring include the frequency of occasions of alcohol use in the past year, the amount of use on one occasion in the past year, and the amount of alcohol use on a typical day in the past year. A 5-point Likert-type scale with a range of 0 (never) to 4 is used by participants to rate each item. It is classified into three categories: "Never" (score 0), "Low-risk" (score 1 to 7), and "Hazardous" (score 8 to 15).

Psychological distress (PD): PD was measured with the General Health Questionnaire (GHQ) (Lundin et al., 2016), which has been widely used. Participants' GHQ was evaluated using 12 items on a 4-point Likert scale (scores of 0, 1, 2, or 3). The total score ranged from 0 to 36, with lower scores representing better mental health and higher scores indicating higher levels of psychological distress.

Self-control (SC): SC was evaluated using the seven-item Pearlin Mastery Scale (PMS) (Pearlin Mastery Scale IRT Item Parameter Estimates, Scores and Standard Errors with Custom Weighted Z-Scores and Percentile Ranks, n.d.), which assesses how much an individual feels typically in control of significant life outcomes) (i.e., psychological coping). A 5-point Likert scale with the options "strongly disagree" (point 1) to "strongly agree" (point 5) was used to ask participants how much they agree with certain statements. The sum of the items produced a total score that ranged from 7 to 35, with larger values signifying higher levels of mastery (i.e., self-control).

Problem-gambling (PG): The South Oaks Gambling Screen-Revised Adolescent (SOGS-RA) (Wiebe et al., 2000), the most widely used screening instrument for gambling problems among adolescents, was used to indicate PG. It consists of twelve items; each is scored either 1 (affirmative) or 0 (non-affirmative). Although there are some variations between studies in the interpretation of scores, generally a score of 4 or greater is labelled as "problem gambling", a score between 2–3 as "at-risk" and a score of 0–1 as "no problem".

Drug abuse (DA): DA was determined using the Drug Abuse Screening Test (DAST-10) (Shirinbayan et al., 2020). The screening test contains 10 questions that, without mentioning any specific drugs, assess problematic drug use in general. In the DAST-10, all questions receive a

score of "1" when "yes" is answered, with the exception of question 3, which receives a score of "1" when "no" is responded. Higher scores suggest drug-related issues that are more hazardous.

Statistical analyses

All data analyses were conducted using statistical package, SPSS 25. (i) descriptive analysis of the participants' socio-demographic characteristics and the level of AU, PD, as well as hypothesised mediators, (ii) correlational analysis of the variables using Holm adjustment to reduce the possibility of type 1 error, and (iii) a parallel multiple mediation analysis were employed to examine whether SC, PG, and DA would mediate the relationship between PD and AU.

To determine whether the data were appropriate for the study, assumptions of the parallel multiple mediation were examined. In parallel multiple mediation model, mediators are assumed to not causally influence one another (Tabachnick, 2007). This contrasts with serial multiple mediation models (Bolin, 2014) in which mediators do have a causal effect on one another. However, mediators in parallel multiple mediation models are assumed to be correlated, they are all theorised to play a role in the relationship between the same two variables (Bolin, 2014). The mediators in the mediation model's preliminary correlational analysis showed that these variables were related but not multicollinear. It is possible to detect multicollinearity between variables when r0.80 (Osborne & Waters, 2002). There was no evidence of multicollinearity among the mediators in this investigation, as shown by the correlation coefficients for the mediators, which ranged from r=0.01 to 0.31 (Table 1).

In the mediation analysis model, the relation between the predictor variable (PD) and outcome variable (AU) is indicated by the "c" path. This relation is also known as the total effect. The relationship between the mediator variable (i.e., SC) and the predictor variable (PD) is shown by the "a1" path. The relationship between the mediator variable (SC) and the outcome variable (AU) is represented by the "b1" path. The path "ab1" is an estimation of SC's potential role as a mediator in the relationship between PD and AU, and it is roughly the product of the two paths (axb). Similar depictions illustrate the paths "a2", "b2", and "ab2" for PG and "a3", "b3", and "ab3" for DA. While accounting for the mediators' indirect effects, the "c" path shows the direct route from the predictor (PD) to the result (AU).

RESULTS

Socio-demographics of participants

Out of 1,538 participants, there were 458 participants who "Never" drank alcohol which was 29.8% of total participants, with 186 being male and 272 being female. There were more participants who were under 18 years of age (n=302) compared to those over 18 years of age (n=156). There were 438 male participants and 458 female participants classified in the "Low-risk" alcohol drinking category. Among this group, there were 460 participants who are over 18 years of age, compared to those under 18 (n=436). The "Hazardous" alcohol drinking category comprises significantly more male participants (n=114), compared to those who are female (n=70). In this category, there were more participants who are over 18 years of age (n=112) than those who were under 18 (n=72). Regarding PD, 60.2% (n=924) of participants were having low level of PD, whereas 39.8% (n=612) of those having high level PD. The level of SC was almost equally distributed among participants in which 31.5% with low SC, 31.2% with moderate SC, and 37.3% with high SC. Among 1,538 participants, 1260 (81.9%) did not have problem gambling where 128 (8.3%) were at risk of PG, and 150 (9.8%) were having PG. In terms of DA, 89.9% (n=1,382) did not have problem DA, where 6.4% (n=98), 2.6% (n=40), and 1.2% (n=18) were having DA with low-level, moderate-level, and substantial level respectively (Table 1).

The Correlation of variables

Correlational analysis showed that AU was positively correlated with PD ($r=0.14$, $p<0.01$), PG ($r=0.31$, $p<0.01$), and DA ($r=0.18$, $p<0.01$), and negatively correlated with SC ($r=-0.03$, >0.05), however the correlation with SC is statistically not significant, whereas the correlation with other three variables is. PD is negatively correlated with SC ($r=-0.14$, $p<0.01$), and positively correlated with DA ($r=0.05$, $p<0.05$), and PG ($r=0.05$, >0.05), however correlation with PG is statistically not significant. SC is negatively correlated with PG ($r=-0.14$, $p<0.01$), and DA ($r=-0.01$, >0.05), however correlation with DA is statistically not significant. PG is positively correlated with DA ($r=0.27$, $p<0.01$) (Table 2).

The mediating effect of self-control, problem gambling, and drug abuse on the association between psychological distress and alcohol use

In order to determine if SC, PG, and DA would mediate the link between AU and PD, a parallel multiple mediation study was carried out (figure 1). The analysis's findings showed that the mediation model was statistically significant ($F[4,1533] = 53.09$, $p<0.001$), and that it explained almost 14% of all the variance in AP ($R^2=0.14$). Figure 1 shows that PD had statistically significant direct effects on the outcome variable AU (C'=0.080, SE=0.016, P<0.001) as well as statistically significant indirect effects on two of the three mediators, SC (a1=-0.28, SE=0.05, P<0.001) and DA (a3=0.01, SE=0.01, P=0.03). PD, however, had no significant effect on PG (a2=0.02, SE=0.01, P=0.06). Additionally, the paths from PG and DA had statistically significant effects on the outcome variable, AU (b2=0.49, SE=0.04, P=0.001) and (b3=0.33, SE=0.09, P=0.001), respectively, while the path from SC did not (b1=0.01, SE=0.01, P=0.20). PG and DA were important mediators of PD's significant indirect effects on AU (ab2=0.009, 95%CI [0.001,0.019] and ab3=0.003, 95%CI [0.001,0.008]), whereas SC was not (ab1=-0.01, 95%CI [-0.007,0.002]). The overall effect of PD on AU was statistically significant (C=0.089, SE=0.017, P<0.001) after accounting for all three mediators.

To determine the statistical significance of indirect effects in multiple mediation analyses, 95% confidence intervals need to be considered (Shrout & Bolger, 2002). Support for two of the three indirect effects in this study, PD and AU as mediated by PG (ab2=0.009, 95%CI [0.001,0.019]) and by DA (ab3=0.003, 95%CI [0.001,0.008]), was identified. However, there was no evidence to support the hypothesis that SC mediates the relationship between PD and AU (ab1=-0.01, 95%CI [-0.007,0.002]). These results show that partial mediation effects were present for two of the three mediator variables (i.e., PG and DA) in the association between PD and AU after accounting for their significant direct effect (i.e., C'). (Figure 1)

DISCUSSION

In the absence of a robust body of research seeking to establish factors which may underlie the relationship between PD and AU, this study is the first to determine the mediating role of SC, PG, and DA in the association between PD and AU. Consistent with the previous literature, this study suggests that individuals who experience PD are associated with the development of AU. Since this study was cross-sectional, we were unable to look for a causal relationship. However, the relation between PD and AU in young adults is most likely intricate and multifaceted. For example, SC, PG, and DA may make a young adult more likely to use

alcohol, but PD may also make these issues worse. On the other hand, the reason for using alcohol in those who have PD might be their belief to cope PD with AU. Nonetheless, studies suggested that the AU as a coping mechanism for PD may provide short-term respite, but it can also eventually result in maladaptive AU behaviours. In particular, using AU to lessen PD has a negative feedback loop that makes it more likely that people may use alcohol to cope with stress in the future (Sayette, 2017; Sinha, 2008). This is further reinforced by the literature (Mohr et al., 2013; O'Hara et al., 2015; Risi et al., 2019), which noted that alcohol abuse is commonly connected to the escaping or avoiding of discomfort related to PD. The association between PD and AU may also be due to shared aetiological factors such as genetic predisposition, environmental factors, social influences, and individual vulnerability.

This study partially confirmed the prediction that SC, PG, and DA would moderate (via indirect effects) the association between PD and AU. Particularly, PG and DA mediated the association between PD and AU, whereas SC was not found to mediate the relationship. Regarding the mediation effect of DA, previous studies, which revealed that people with PD consume drugs and that those who drink alcohol had higher DA risks than their peers, also confirm the finding that DA mediates the association between PD and AU (Whitesell et al., 2013). There can be several reasons why DA mediates the association between PD and AU. For instance, those who abuse drugs might combine alcohol with their DA to enhance the effects or manage withdrawal symptoms. Additionally, certain factors, such as shared risk factors, social networks, or common underlying vulnerabilities, can contribute to the co-occurrence of DA, PD, and AU.

The mediation effect of PG on the association between PD and AU are in line with previous studies stating that problem gamblers hold more cognitive distortions such as PD compared with non-problem gamblers (Bergevin et al., 2006; Mark, 1994). A possible explanation is that individuals with PG may use alcohol as a way to enhance their gambling experience or cope with the negative consequences of their gambling behaviour. Additionally, both PG and AU can be influenced by similar underlying factors such as DA or decreased SC. There are some studies, however, which stated that PG was not associated with the AU (Forsström et al., 2022; The Relationship Between Alcohol and Gambling Behaviours, n.d.). Such findings might be due to the fact that the gambling measures utilised in previous studies and this study might differ. Contrary to the previous studies, SC did not modulate the

association between PD and AU. Indeed, SC varies in quality and quantity, and it is experienced uniquely in different social and normative environments (Horstkötter, 2015). This could be due to the fact that the previous studies could not explain the casual direction of decreased SC and AU. A possible explanation could be that AU causes decreased SC rather than the fact that decreased SC leads to AU (i.e., SC is not a determinant but a consequence of AU). Another possible explanation is that other factors such as coping strategies, social influences, or individual vulnerabilities may play a more significant role in explaining the association between PD and AU.

There are some limitations on this study, though. First, because the study is cross-sectional, it disallows drawing conclusions about the causes of the associations. Although our analyses provide theoretical evidence, it needs to be verified in longitudinal settings. Second, the study's age range is limited, and a wider age range would allow a more detailed investigation of age-related effects of AU and PD. Third, since the variables were self-reported, there may be bias in the results such as providing socially desired answers. Also, self-reported questionnaires do not provide information regarding the existence of a clinical diagnosis, and the lack of a clinical interview in confirming a formal diagnosis is a limitation of this study. This study also has a number of advantages. First off, it is a sizable sample of young adults drawn from a well-defined population. Second, recent data enables an updated understanding of young adults' existing statuses. Third, although it was self-reported data, the study used reliable measures of AU and DA, as well as the validated questionnaire for PD, SC, and PG.

CONCLUSION AND FUTURE DIRECTIONS

The high rates of PD, AU, PG and DA among young adults have major implications, not only with psychological morbidity that will have adverse effects on their physical health, development, educational attainment, and quality of life but also the deteriorating influence on their families and educational institutions. This study showed evidence on the association between PD and AU. The study also contributed to the awareness on the mediating role of SC, PG, and DA on the association between PD and AU. There is still a need for further research on such mediating roles in a general population of adolescents and a wider population context. The mediating effect of PG and DA between the association of AU and PD might be due to an underlying neurological condition contributing to these situations. This merits further

investigation. This study suggests PD and AU, together with PG and DA reflect a public health issue that highlights the necessity for preventive measures. Specifically, efforts should be made on PG and DA upon prevention and intervention strategies on AU and/or PD. For instance, educational programmes focused on PG and DA among young adults might also be beneficial to help them from PD and AU, and maintain overall well-being.

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