

Moderation effect of emotion regulation on the relationship between social anxiety, drinking motives and alcohol related problems

Sojung Kim

Hanyang University Seoul Hospital <https://orcid.org/0000-0002-5747-1052>

Jung-Hye Kwon (✉ junghye@korea.ac.kr)

<https://orcid.org/0000-0001-5201-3645>

Research article

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Abstract

Abstract Background: Accumulated evidence suggests that individuals with social anxiety disorder (SAD) are at particular risk of developing alcohol use disorder (AUD). Yet, little is known about the mechanisms under this high comorbidity. This study aimed to elucidate the process of development of alcohol related problems (ARP) among individuals with elevated social anxiety (SA). We examined the moderation effect of difficulties in emotion regulation (DER) on the relationship between cognitive-behavioral-physiological symptoms of SA, coping and conformity motives and ARP. **Methods:** In a sample of university students (N = 647) in South Korea, the proposed model in which fear of negative evaluation (FNE), social avoidance, and concerns over physiological symptoms (CPS) were supposed to affect ARP with the mediation of coping and conformity motives was tested. Furthermore, DER was hypothesized to moderate each mediational path. **Results:** Results showed that FNE and CPS predicted ARP with the mediation of conformity and coping motives, respectively. As hypothesized, each path was moderated by DER. **Conclusions:** Findings suggest that coping and conformity motives to cope with cognitive and physiological symptoms of SA were related to ARP. In addition, individuals with high levels of DER were prone to exhibit more ARP.

Background

Alcohol-related problems among individuals with social anxiety disorder: Mediation of clinical characteristics of social anxiety and coping and conformity motives

Individuals with social anxiety disorder (SAD) are at a higher risk for alcohol or substance use disorders, even when compared to those with other anxiety disorders [1, 2]. This high rate of comorbidity is significant as it aggravates the daily functioning of individuals with SAD and chronicizes the disorder [3]. Over the last two decades, there have been a number of studies on alcohol related problems (ARP) among individuals with SAD. Despite the co-occurrence of the two disorders, inconsistent findings make it difficult to clarify the relationship between social anxiety (SA) and ARP. SA had negative associations with the frequency of drinking and binge drinking. In addition, SA did not show a significant relationship with drinking quantity [4,5]. According to previous studies, drinking among individuals with SAD was context-dependent [6,7] and different from that of individuals with typical alcohol use disorder (AUD). Therefore, it is necessary to investigate SAD specific risk factors for ARP.

Buckner, Heimberg, Ecker, and Vinci [8] proposed a biopsychosocial model of SA and substance use. According to their model, SA specific symptoms, such as physiological arousal, fear of negative evaluation (FNE), low positive emotion, perceived social deficits, and social avoidance predicted dependence on substances via the mediation of the motivation to cope with each symptom, which ultimately led to substance use disorders. While the biopsychosocial model [8] was the first to propose specific physiological, cognitive, and behavioral symptoms of SAD that contribute to the development of substance use disorders, it was a theoretical model for substance use disorders in general and did not conceptualize specific drinking motives related to each SA symptom.

In previous research on ARP in SAD, individuals with elevated SA drink to cope with their negative emotions (coping motives) or to conform as a means of getting along with others and ensure that they are not isolated (conformity motives)[9-11]. Moreover, accumulating evidence suggests that certain SAD symptoms, such as SA

or fear of evaluation, with the mediation of coping and conformity motives, predicts drinking situations and ARP [12-15]. Considering that drinking with coping and conformity motives differs from socially acceptable drinking and is strongly related to ARP, even when drinking quantity is controlled [16], it is not surprising that people with SAD become dependent on drinking to regulate their symptoms and therefore experience more ARP, even if they drink a small amount of alcohol [9]. Despite these findings, insufficient research has been conducted to provide a comprehensive examination of the paths in which each SAD symptom predicts ARP and to clarify the drinking motives involved.

Impact of difficulties in emotion regulation on alcohol-related problems in individuals with social anxiety disorder

When individuals with high SA experience greater coping and conformity motives, they become more vulnerable to ARP. In addition, difficulties in emotion regulation (DER) strengthen the relationship between SAD and coping and conformity motives and increase the risk of ARP. DER refers to processes that influence the occurrence, intensity, duration, and expression of emotions [17]. It is strongly related to anxiety and depression and constitutes a risk factor for anxiety disorders and ARP [18]. Individuals with SAD, experience not only anxiety in social situations but also chronically elevated negative emotions and dampened positive emotions in daily life [19]. The urgent need to resolve emotional distress increases the tendencies to use maladaptive emotion regulation strategies, such as suppression, denial, rumination and drinking which provide instant satisfaction, rather than adaptive emotion regulation strategies, such as cognitive re-appraisal or acceptance, which require considerable cognitive resources in stressful situations [17]. This is risky as maladaptive emotion regulation strategies make individuals with SAD experience higher levels of negative emotions for a longer period of time and lead to secondary drinking problems [20-23]. DER is also associated with ARP. DER showed correlations with quantity and frequency of drinking and it was a variable that distinguished social drinking from alcohol dependence [24]. Application of maladaptive emotion regulation strategies showed significant relationship with ARP [25].

DER is one of the cardinal factors in the development of AUD among individuals with anxiety disorders, as substance use disorders and emotional disorders share failure of negative emotion regulation as their diagnostic characteristics [26, 27]. In precedent studies, DER mediated the relationship between negative affect which constitutes a dispositional characteristic of anxiety disorders, and drinking motives used to cope with this affect [28]. In addition, DER moderated the relationship between anxiety sensitivity and ARP [29]. From a developmental perspective, young people with emotional disorders, including SAD, are at high risk of AUD [3, 30]. Drinking for the purpose of emotion regulation was identified as the most common cause of dependent drinking in the internalizing paths of AUD [31].

In light of these findings, emotion regulation appears to play a very important role in the developmental paths from SA to ARP. Yet, to our knowledge, there is a dearth of empirical research on the relationship between DER, SAD specific symptoms, coping and conformity motives and ARP. Hence, this study aimed to verify a model in which cognitive-behavioral-physiological symptoms of SA predict ARP with the mediation of coping and conformity motives, based on the biopsychosocial model of Buckner et al. (2013).[8] Furthermore, we assumed the moderation effect of DER. That is, among individuals with elevated SA, those with greater DER were predicted to experience stronger coping and conformity motives, leading to an increase in ARP.

Methods

Participants and Procedures

Participants were recruited nation-wide from multiple universities in South Korea. Of the 668 students who completed the survey, 21 were excluded due to questionable validity of their responses (i.e. omitting more than 20% of the items, not providing demographic information). The final sample of 647 consisted of 445 females (68.8%) and 202 males (31.2%). The mean age was 20.92 ($SD= 3.20$) and the age ranged between 17 and 48. Participants were either introduced to this study during psychology classes or given information on the college community web page. All participants were informed that the purpose of the study was to investigate the relationship between social anxiety and alcohol use problems. The participants were provided a packet of self-report measures which takes 30 minutes to complete. The Institutional Review Board of authors' university approved the study procedures and all participants provided informed consent prior to data collection.

Measures

Social Phobia Scale (SPS)

SPS was developed as a pair scale with SIAS by Mattick and Clark [32]. It consists of 20 items, which measure fear of performance related situations such as eating with others or being a focus of attention. Internal consistency, reliability, and validity were good in previous studies [32,33]. In a validation study of Kim, Yoon, & Kwon [34], the Korean version of SPS showed good internal consistency (Cronbach's $\alpha = .94$). Internal consistency in this study was satisfactory (Cronbach's $\alpha = .92$).

Social Interaction Anxiety Scale (SIAS)

SIAS was developed as a pair scale with SPS by Mattick and Clark [32]. It consists of 20 items, which measure fear of social interactions including talking to two or more persons. SIAS has high internal consistency, retest reliability and excellent validity in previous studies [32, 33]. The Korean version of SIAS showed fine internal consistency (Cronbach's $\alpha = .88$) [34]. Internal consistency in the current sample was good (Cronbach's $\alpha = .93$).

Brief-Fear of Negative Evaluation Scale (B-FNE)

This scale measures fear of being negatively evaluated by others. Watson and Friend [35] originally developed FNE and Leary [36] selected items with correlation scores higher than .50 for the brief version of the scale. The original scale was made as a binary scale, but we used the translated version of Lee and Choi [37] which was modified as a Likert scale which ranges from 1 (never) to 5 (very much). Internal consistency reported by Lee and Choi [37] was good (Cronbach's $\alpha = .90$). Internal consistency in the current sample was acceptable (Cronbach's $\alpha = .85$).

Anxiety Sensitivity Index-3 (ASI-3)

Reiss, Peterson, Gursky, and McNally [38] developed the ASI to assess fear of anxiety symptoms. Taylor and Cox [39] extended the scale by deleting six items from the original scale and adding 26 items. Later, Taylor et al. [40] modified the extended version of ASI and developed the ASI-3, which consists of 18 items on three

subscales: physical, social and cognitive concerns. We used the social concerns subscale in the Korean version of ASI-3 [41] to assess concerns of physiological symptoms (CPS) related to SA. Internal consistency reported by Lim and Kim [41] was appropriate (Cronbach's $\alpha = .87$). In this study, internal consistency for the total 18 items was good (Cronbach's $\alpha = .91$) and internal consistency for the social concerns subscale was acceptable (Cronbach's $\alpha = .82$).

Social Phobia Diagnostic Questionnaire (SPDQ)

SPDQ is a 25-item self-report measure developed by Newman, Kachin, Zullig, Constantino, and Cashman-McGrath [42] to diagnose SAD. Among the 25 items, 16 items were designed to measure fear and avoidance in different social situations. We used the total score of avoidance of social situations as a social avoidance variable in the model. The original version of the SPDQ showed good internal consistency (Cronbach's $\alpha = .92$). The Korean version of SPDQ also had satisfactory internal consistency (Cronbach's $\alpha = .91$) [43]. Internal consistency in the current sample was good (Cronbach's $\alpha = .95$).

Drinking Motives Questionnaire-Revised (DMQ-R)

DMQ-R is a 20-item self-report measure developed to assess reasons for drinking alcohol by Cooper [16]. There are four subscales in the scale: coping motives, social motives, enhancement motives and conformity motives. DMQ-R had good internal consistency [16]. We used the Korean version of DMQ-R validated by Ha and Tak [44]. Internal consistency of DMQ-R in our sample was acceptable: total items (Cronbach's $\alpha = .91$), conformity subscale (Cronbach's $\alpha = .68$), and coping subscale (Cronbach's $\alpha = .89$).

Difficulties in Emotion Regulation Scale (DERS)

DERS is a 36-item self-report measure to assess the level of difficulties in emotion regulation [45]. In a validation study, internal consistency was good (Cronbach's $\alpha = .93$) and 4-8week test-retest reliability and validity were also satisfactory [45]. We used the Korean version of DERS which was validated by Cho [46]. K-DERS showed good internal consistency (Cronbach's $\alpha = .92, .93$) [46]. Internal consistency in the current sample was good (Cronbach's $\alpha = .93$).

Alcohol Use Disorders Identification Test (AUDIT)

AUDIT was developed to screen AUD and dangerous drinking by the World Health Organization in 1989 [47]. In Korea, Lee, Lee, Lee, Choi and Nam [48] translated and validated the Korean version of AUDIT which had good reliability and validity. There are three subscales in AUDIT: alcohol dependence, harmful drinking, and dangerous drinking. In this study, internal consistency for total items was .85. Based on previous research outcomes that SA is related to ARP rather than drinking quantity or frequencies [4, 5], we used the harmful drinking subscale and the dangerous drinking subscale for this study. Internal consistency for the two subscales were .59 and .72, respectively.

Statistical Analysis

Descriptive statistics on epidemiological characteristics and psychological variables were analyzed via the IBM SPSS 20. Moderated mediation analyses were executed on the IBM SPSS AMOS 21. The moderated mediation model is a combined model of a mediation model and a moderated model which predisposes mediational

effect and examines the differing level of mediational effect with the level of a moderator [49]. According to the suggestions of Preacher, Rucker, and Hayes [50], mediation modeling, moderated modeling, and moderated mediation modeling were conducted in sequence. Meditational analysis was conducted using one independent variable (SA), five mediators (fear of negative evaluation, social avoidance, concerns over physiological symptoms, conformity motives, and coping motives), and one dependent variable (ARP). Two separate moderation analyses were performed using one independent variable (fear of negative evaluation or concerns over physiological symptoms), one moderator (DER) and one dependent variable (conformity motives or coping motives). Moderated mediation analysis was conducted using one independent variable (SA), five mediators (fear of negative evaluation, social avoidance, concerns over physiological symptoms, conformity motives, and coping motives), one moderator (DER) and one dependent variable (ARP). The number of bootstrap samples for bias corrected bootstrap confidence intervals was 10,000. For each model's fit analysis, Tucker Lewis Index (TLI), Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) were applied. In the analyses of data including more than 250 subjects, TLI and CFI are proper when they are bigger than .90, RMSEA is good if it is .05 or smaller, proper if .08 or smaller and not good if .10 or bigger [51, 52].

Results

Correlations between the variables

Before conducting structural equation modeling analyses, we administered descriptive statistics and correlation analysis between the variables. Results are shown in Table 1.

Table 1. Correlations, means and standard deviations of the variables

	SIAS	SPS	FNE	Social avoidance	CPS	DERS	DMQ-R	Conformity motives	Coping motives	AUDIT	ARP
SIAS	1										
SPS	.76**	1									
FNE	.65**	.64**	1								
Social avoidance	.73**	.63**	.49**	1							
CPS	.56**	.57**	.61**	.48**	1						
DERS	.55**	.46**	.50**	.47**	.45**	1					
DMQ-R	.06	.14**	.20**	.06	.22**	.22**	1				
Conformity motives	.22**	.22**	.29**	.16**	.25**	.27**	.56**	1			
Coping motives	.13**	.15**	.21**	.11**	.26**	.32**	.66**	.27**	1		
AUDIT	-.08*	.01	-.01	-.08*	.06	.07	.48**	.24**	.35**	1	
ARP	.03	.11**	.06	.02	.15**	.17**	.39**	.25**	.35**	.90**	1
M	29.40	19.22	35.49	20.54	7.02	81.01	46.01	4.51	7.83	8.39	2.81
SD	14.66	13.72	8.32	10.45	5.08	20.15	14.21	2.04	3.82	5.88	3.70

Note. SIAS: Social Interaction Anxiety Scale, SPS: Social Phobia Scale; FNE: Fear of Negative Evaluation Scale; CPS: Concerns over physiological symptoms; DERS: Difficulties in Emotion Regulation Scale; DMQ-R: Drinking Motives Questionnaire-Revised; AUDIT: Alcohol Use Disorders Identification Test, ARP: Alcohol Related Problems.

* $p < .05$. ** $p < .01$.

SIAS and SPS had positive correlations with FNE, social avoidance, CPS and DERS. SIAS and SPS were positively correlated with conformity motives and coping motives. However, SIAS showed a negative correlation with the total score of AUDIT. SPS did not show a significant relationship with the total score of AUDIT, $r = .01$, $p = .86$. SIAS did not show significant correlation with ARP, $r = .03$, $p = .49$, while SPS had positive correlation with ARP.

FNE, social avoidance, CPS and DERS had positive correlations with conformity motives and coping motives. ARP did not show significant correlations with either FNE or social avoidance, all $ps > .05$. While CPS and DERS showed positive correlations with ARP.

Relationship between social anxiety and alcohol-related problems: Mediation effect of cognitive-behavioral-physiological characteristics of social anxiety and coping and conformity motives moderated by difficulties in emotion regulation

We administered structured equation modeling (SEM) to examine the moderated mediational effects of clinical characteristics of SA and coping and conformity motives in the relationship between SA and ARP, based on the biopsychosocial model of SAD and substance use disorders [8] (Buckner et al., 2013). In our research model, clinical characteristics of SA: FNE, social avoidance and CPS were hypothesized to predict ARP with the

mediation of coping and conformity motives. Furthermore, we supposed that DER would moderate the relationship between cognitive-behavioral-physiological characteristics of SA and coping and conformity motives.

Mediation model analysis

Among the research variables in the study, FNE, social avoidance, and DER were made into latent variables via item parcelling [53].

Results from the mediation model analysis showed that the research model fits our data well, χ^2 (234, $N = 647$) = 581.313, TLI = .953, CFI = .960, RMSEA = .048 (90% CI = .043 - .053). SA was positively correlated with FNE, social avoidance and CPS. FNE predicted conformity motives, while the path from FNE to coping motives was not significant. Social avoidance did not significantly predict conformity motives and coping motives, respectively. CPS positively predicted coping motives. However, it did not significantly predict conformity motives. Both conformity motives and coping motives positively predicted ARP. Meanwhile, a direct path from SA to ARP was not significant. In addition, direct paths from SA to conformity motives and coping motives were not significant, respectively. For the details, refer to Figure 1.

Considered collectively, results from mediation analysis suggest that SA does not directly predict ARP, but it indirectly predicts ARP. SA predicts coping and conformity motives via the mediation of cognitive and physiological symptoms. In turn, cognitive and physiological symptoms of SA predict ARP with the mediation of coping and conformity motives.

To examine the significance of indirect effects of SA, bootstrapping was conducted according to the suggestions of Shrout and Bolger [54]. The indirect effects were estimated from 10,000 samples that were randomly drawn from the raw data, and were tested in the 95% confidence interval. Results showed that direct effect of SA on ARP was not significant, while the indirect effect was significant. Indirect effect of CPS on ARP was significant. Also, indirect effect of FNE on ARP was significant. However, social avoidance did not show significant direct effect on both conformity motives and coping motives. It also did not show significant indirect effect on ARP. Direct, indirect and total effects are presented in Table 2.

Table 2. Direct, indirect and total effects between variables in the mediation model

Path	Direct effect	Indirect effect (confidence interval)	Total effect
SA → social avoidance	.82 ^{***}	-	.82 ^{***}
SA → CPS	.69 ^{***}	-	.69 ^{***}
SA → FNE	.77 ^{***}	-	.77 ^{***}
SA → coping motives	-.16	.33 (.05-.63)	.17 ^{**}
SA → conformity motives	.08	.23(-.08-.53)	.31 ^{***}
social avoidance → coping motives	.05	-	.05
social avoidance → conformity motives	-.05	-	-.05
CPS → coping motives	.24 ^{**}	-	.24 ^{**}
CPS → conformity motives	.12	-	.12
FNE → coping motives	.16	-	.16
FNE → conformity motives	.24 [*]	-	.24 [*]
SA → ARP	-.07	.13 (.07-.20)	.06
social avoidance → ARP	-	.01(-.11-.11)	.01
CPS → ARP	-	.11 (.04-.20)	.11 ^{**}
FNE → ARP	-	.11 (.01-.22)	.11 [*]
coping motives → ARP	.34 ^{***}	-	.34 ^{***}
conformity motives → ARP	.23 ^{**}	-	.23 ^{**}

Note. SA: Social anxiety; CPS: Concerns over physiological symptoms; FNE: Fear of negative evaluations; ARP: Alcohol related problems.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Moderated model analysis

We tested moderated models under the suggestions of Preacher et al.[50]. We examined the moderation effect of DER on 1) the path between FNE and conformity motives and 2) the path between CPS and coping motives. Ping's method [55] was applied to test the significance of the model fit and moderation effects.

Results showed a good model fit to the data. Model fit of moderation model of DER on the relationship between FNE and conformity motives (moderation model 1) was good, $\chi^2(39, N = 647) = 102.999$, TLI = .977, CFI = .984, RMSEA = .050 (90% CI = .039 -.062). A direct path from the interaction variable (FNE x DER) to conformity motives was also significant, $\beta = .06$, $p < .01$. In addition, moderation model of DER on the relationship between CPS and coping motives (moderation model 2) fits the data well, $\chi^2(35, N = 647) = 266.024$, TLI = .959, CFI = .967, RMSEA = .057 (90% CI = .050 - .065). Also, a direct path from the interaction variable (CPS x DER) to coping motives was significant, $\beta = .12$, $p < .01$.

To further examine the moderation effect of DER, we divided participants into two groups: high DER group (+1 SD above the mean) and low DER group (-1 SD below the mean). Results supported that the level of DER moderated the effect of FNE on conformity motives and the effect of CPS on coping motives, respectively. See Figure 2.

High DER group showed a larger moderation effect in the relationship between FNE and conformity motives compared to the low DER group, respectively, $b = .07, p < .001$, $b = .03, p < .05$. Also, high DER group showed a significant relationship between CPS and coping motives, $b = .15, p < .001$. While low DER group did not show a significant relationship between CPS and coping motives, $b = .03, p > .05$.

Moderated mediation model analysis

Lastly, we analyzed a moderated mediation model that included two interaction terms (FNE x DER, CPS x DER). The moderated mediation model fits the data well, $\chi^2(370, N = 647) = 1247.499$, TLI = .913, CFI = .926, RMSEA = .061(90% CI = .057 - .064). See figure 3 for details.

We examined whether DER moderates 1) the indirect effect of FNE on ARP via conformity motives, 2) the indirect effect of CPS on ARP via coping motives when using the bootstrapping method. Results showed that the indirect path from interaction term of FNE and DER to ARP with the mediation of conformity motives was significant. Also, the indirect path from interaction term of CPS and DER to ARP with the mediation of coping motives was significant. Refer to Table 3.

Table 3. Direct, indirect and total effects of variables in the moderated mediation model

Path	Direct Path	Indirect Path (Confidential Interval)	Total Effect
SA → DER	.59 ^{***}	-	.59 ^{***}
SA → Social Avoidance	.82 ^{***}	-	.82 ^{***}
SA → CPS	.68 ^{***}	-	.68 ^{***}
SA → FNE	.77 ^{***}	-	.77 ^{***}
SA → Coping motives	-.29 [*]	.44(-.18-.72)	.15 ^{**}
SA → Conformity motives	-.01	.30(-.01-.61)	.29 ^{***}
DER * CPS → Coping motives	.09 [*]	-	.09 [*]
FNE * DER → Conformity motives	.14 [*]	-	.14 [*]
DER → Coping motives	.33 ^{***}	-	.33 ^{***}
DER → Conformity motives	.16 [*]	-	.16 [*]
Social Avoidance → Coping motives	.03	-	-.03
Social Avoidance → Conformity motives	-.06	-	-.06
CPS → Coping motives	.17 [*]	-	.17 [*]
CPS → Conformity motives	.09	-	.09
FNE → Coping motives	.13	-	.13
FNE → Conformity motives	.26 [*]	-	.26 [*]
SA → ARP	-.11	.16(.08-.25)	.05
CPS * DER → ARP	-	.03(.00-.07)	.03 [*]
FNE * DER → ARP	-	.03(.01-.08)	.03 [*]
DER → ARP	.08	.14(.09-.21)	.22 ^{**}
Social Avoidance → ARP	-	-.00(-.11-.09)	-.00
CPS → ARP	-	.08(.01-.16)	.08 [*]
FNE → ARP	-	.10(.00-.21)	.10 [*]
Coping motives → ARP	.33 ^{***}	-	.33 ^{***}
Conformity motives → ARP	.22 ^{**}	-	.22 ^{**}

Note. SA: Social anxiety; DER: Difficulties in emotion regulation; CPS: Concerns over physiological symptoms; FNE: Fear of negative evaluations; ARP: Alcohol related problems.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

This study examined a moderated mediation model in which the symptoms of SA predict ARP via the mediation of coping and conformity motives and that the mediational paths were moderated by DER. Results showed that the cognitive and physiological characteristics of SA predicted ARP via the mediation of coping and conformity motives. In addition, DER moderated the mediational paths for each symptom.

Of the cognitive characteristics of SA, FNE predicted ARP through conformity motives. This finding is consistent with those of previous studies in which FNE was the strongest predictor of ARP mediated by coping and conformity motives and was more strongly correlated with ARP relative to SA or avoidance [56]. However, the path from FNE to ARP mediated by coping motives was not significant; this finding was inconsistent with those of Steward et al. [10], in which FNE predicted ARP via the mediation of both coping and conformity motives. This difference may have occurred because FNE was the only variable related to symptoms of SAD in the research model of Steward et al. [10], while multiple mediators pertaining to the behavioral and physiological characteristics of SA were included in the current study and revealed distinctive paths for each variable. In other words, individuals who fear the evaluations of others in social situations drink because of external motives to fit in and avoid being isolated, and this external and negative reinforcement is more an important motive than resolving their internal discomfort. Meanwhile, CPS predicted ARP via the mediation of coping motives. Socially anxious individuals use substances to reduce uncomfortable sensations resulting from physiological arousal and to hide their symptoms from others [8]. In line with previous findings, CPS was related to conformity motives.

In a study conducted by Terlecki and Buckner [15], of the four drinking motives proposed by Cooper (1994)[16], coping and conformity motives exerted the strongest mediational impacts on drinking in SAD, and each motive was specifically correlated with symptoms of SAD. Their results showed that SA predicted drinking in personal and intimate situations and those that increase negative emotions via the mediation of conformity and coping motives. Based on the findings, they discussed that coping motives were related to drinking to fit in and to avoid negative evaluation and rejection [57, 58], and drinking because of coping motives could occur in personal and intimate situations leading to certain physiological SAD symptoms, or circumstances that increase negative emotions. The current study has significance as it extended the study of Terlecki and Buckner [15] by examining the clinical characteristics of SA individually to verify whether FNE mediated conformity motives and CPS mediated coping motives, to predict ARP.

The paths from social avoidance, which is a behavioral characteristic of SA, to conformity and coping motives were non-significant, and therefore, did not support the research hypothesis. Individuals with elevated SA might experience negative reinforcement by drinking to participate in social situations, but individuals with high social avoidance might experience negative reinforcement through the instant reduction of tension concerning expected social situations by not participating in those situations at all. However, the finding indicating that there was no significant path between social avoidance and coping motives, which is related to solitary drinking with negative emotions, is believed to be related to the participants' characteristics. Individuals with internalizing problems, who tend to drink alone and report serious depression and anxiety, show older age of onset [59-61]. Participants of this study were young university students without pronounced functional impairment. Therefore, it is likely that they had not developed the habit of solitary drinking as a coping motive. Consequently, future research should target a wider age group and determine whether social avoidance is a protective factor in ARP [4] or exerts different effects on ARP according to age.

This study also examined whether, of individuals with elevated SA, those with greater DER experienced strong coping and conformity motives and if this increased ARP. Results demonstrated that DER moderated the paths in which FNE predicted conformity motives, and CPS predicted coping motives. Individuals who are unable to cope with the cognitive and physiological symptoms of SA by using adaptive emotional regulation strategies

could exhibit a tendency to cope via drinking, which could imply that they are vulnerable to ARP [62, 63]. Findings indicating that the impact of emotion regulation was important in the path that connected the cognitive and physiological characteristics of SA to conformity and coping motives have clinical implications: training for emotion regulation focusing each clinical characteristic of SA could help to mitigate ARP. For example, cognitive and behavioral interventions for improving objective views and guided participations in social situations might be beneficial. In addition, interventions supporting people to experience the natural decreasing process of arousal through acceptance, rather than suppressing physiological symptoms or tension through drinking, could aid the prevention and treatment of ARP among individuals with elevated SA.

Limitations

The limitations of the study were as follows. The proposed model was tested with cross-sectional data from self-report measures. Considering that the dependent variable was ARP which is related to a behavioral aspect and that the purpose of the study was to explore the clinical characteristics that mediate ARP among individuals with elevated SA, it could have limited the examination of the path connecting risk factors with problem behaviors using a one-time questionnaire [64]. In addition, the participants were university students, rather than clinical patients. To examine the paths from SA to ARP with a focus on the clinical characteristics of SAD, future studies could benefit from including individuals diagnosed with SAD.

Conclusions

Despite these limitations, as an empirical study, this study contributes to the literature that examines the integrated process from the cognitive and physiological symptoms of SA to ARP via coping and conformity motives, moderated by DER. Of the studies conducted to examine the causal mechanisms underlying ARP in SAD during the past two decades, few have verified a comprehensive model based on empirical data, and theoretical models requiring verification were proposed not long ago [8, 65, 66]. This study has significance, as it examined the mechanism underlying ARP in SAD with focusing on specific SA symptoms and drinking motives via the modified biopsychosocial model of substance use disorder in SAD [8]. The results suggest that interventions targeting cognitive and physiological symptoms of SA and emotion regulation training could prevent habitual drinking in stressful situations among individuals with elevated SA. It will be important to continue to research ARP among individuals with SAD targeting SA specific patterns.

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

We received consent forms from all participants.

Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

SK and JHK conceived the study. SK collected the data and performed the statistical analysis. SK and JHK interpreted the results and reviewed. SK wrote the manuscript. JHK revised the manuscript. SK and JHK approved the final version for publication. Both authors read and approved the final manuscript.

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References

1. Grant BF, Hasin DS, Blanco C, Stinson FS, Chou SP, Goldstein RB, et al. The epidemiology of social anxiety disorder in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *J Clin Psychiatry*. 2005;66:1351–61.
2. Wenzel A, Jager-Hyman S. Chapter 9 - Social Anxiety Disorder and Its Relation to Clinical Syndromes in Adulthood. In: Hofmann SG, DiBartolo PM, editors. *Social Anxiety (Third Edition)*. San Diego: Academic Press; 2014. p. 227–51.
3. Buckner JD, Timpano KR, Zvolensky MJ, Sachs-Ericsson N, Schmidt NB. Implications of comorbid alcohol dependence among individuals with social anxiety disorder. *Depress Anxiety*. 2008;25:1028–37.
4. Eggleston AM, Woolaway-Bickel K. Social anxiety and alcohol use: Evaluation of the moderating and mediating effects of alcohol expectancies. *J Anxiety Disord*. 2004; 18:33-49.
5. Ham LS, Hope DA. Incorporating social anxiety into a model of college student problematic drinking. *Addict Behav*. 2005;30:127–50.
6. Buckner JD, Terlecki MA. Social anxiety and alcohol-related impairment: The mediational impact of solitary drinking. *Addict Behav*. 2016;58:7–11.
7. Keough MT, Battista SR, O'Connor RM, Sherry SB, Stewart SH. Getting the party started—Alone: Solitary predrinking mediates the effect of social anxiety on alcohol-related problems. *Addict Behav*. 2016;55:19–24.
8. Buckner JD, Heimberg RG, Ecker AH, Vinci C. A biopsychosocial model of social anxiety and substance use. *Depress Anxiety*. 2013;30:276–84.
9. Lewis MA, Hove MC, Whiteside U, Lee CM, Kirkeby BS, Oster-Aaland L, et al. Fitting in and feeling fine: conformity and coping motives as mediators of the relationship between social anxiety and problematic

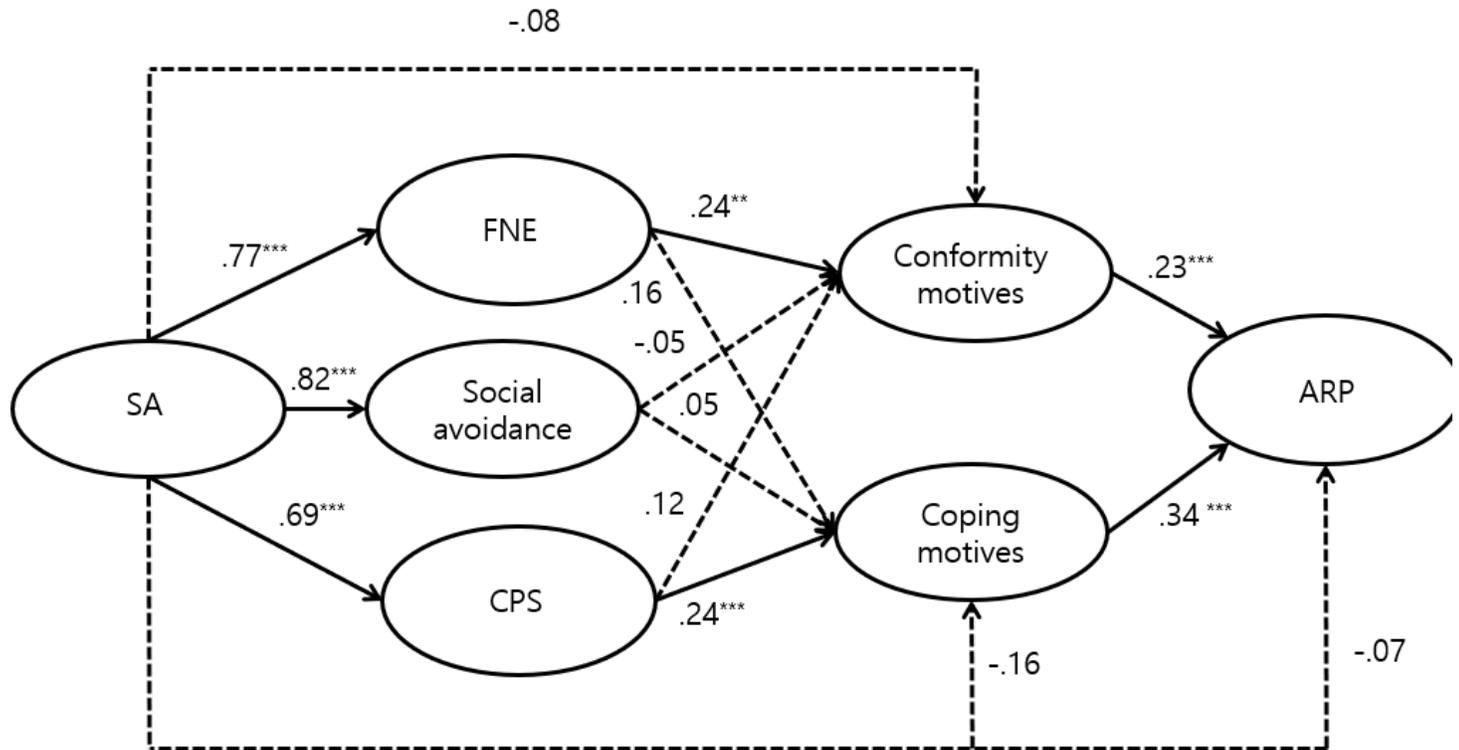
- drinking. *Psychol Addict Behav.* 2008;22:58.
10. Stewart SH, Morris E, Mellings T, Komar J. Relations of social anxiety variables to drinking motives, drinking quantity and frequency, and alcohol-related problems in undergraduates. *J Ment Health.* 2006;15:671–82.
 11. Thomas SE, Randall CL, Carrigan MH. Drinking to cope in socially anxious individuals: a controlled study. *Alcohol Clin Exp Res.* 2003;27:1937–43.
 12. Howell AN, Buckner JD, Weeks JW. Fear of positive evaluation and alcohol use problems among college students: the unique impact of drinking motives. *Anxiety Stress Coping.* 2016;29:274–86.
 13. Morris EP, Stewart SH, Ham LS. The relationship between social anxiety disorder and alcohol use disorders: a critical review. *Clin Psychol Rev.* 2005;25:734–60.
 14. Stewart SH, Zvolensky MJ, Eifert GH. Negative-reinforcement drinking motives mediate the relation between anxiety sensitivity and increased drinking behavior. *Pers Individ Dif.* 2001;31:157–71.
 15. Terlecki MA, Buckner JD. Social anxiety and heavy situational drinking: coping and conformity motives as multiple mediators. *Addict Behav.* 2015;40:77–83.
 16. Cooper ML. Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychol Assess.* 1994;6:117–28.
 17. Campbell-Sills L, Ellard KK, Barlow DH. Emotion regulation in anxiety disorders. In J. J. Gross (Ed.), *Handbook of emotion regulation* (2nd ed.). New York: Guilford Press. 2013.
 18. Aldao A, Nolen-Hoeksema S, Schweizer S. Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clin Psychol Rev.* 2010;30:217–37.
 19. Farmer AS, Kashdan TB. Social anxiety and emotion regulation in daily life: spillover effects on positive and negative social events. *Cogn Behav Ther.* 2012;41:152–62.
 20. Erwin BA, Heimberg RG, Schneier FR, Liebowitz MR. Anger experience and expression in social anxiety disorder: Pretreatment profile and predictors of attrition and response to cognitive-behavioral treatment. *Behav Ther.* 2003;34:331–50.
 21. Spokas M, Luterek JA, Heimberg RG. Social anxiety and emotional suppression: the mediating role of beliefs. *J Behav Ther Exp Psychiatry.* 2009;40:283–91.
 22. Turk CL, Heimberg RG, Luterek JA, Mennin DS, Fresco DM. Emotion Dysregulation in Generalized Anxiety Disorder: A Comparison with Social Anxiety Disorder. *Cognit Ther Res.* 2005;29:89–106.
 23. Werner K, Gross JJ. Emotion regulation and psychopathology: A conceptual framework. In: Kring AM, editor. *Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment*, (pp. New York, NY, US: The Guilford Press, xv; 2010. p. 13–37.
 24. Fox HC, Hong KA, Sinha R. Difficulties in emotion regulation and impulse control in recently abstinent alcoholics compared with social drinkers. *Addict Behav.* 2008;33:388–94.
 25. Song S, Graham JE, Susman EJ, Sohn Y-W. The Role of Ineffective Emotion Regulation in Problem Drinking Varies by Emotional Disposition, Delinquency, and Gender of South Korean Adolescents. *J Child Adolesc Subst Abuse.* 2012;21:367–82.
 26. Association AP, Others. Diagnostic and statistical manual of mental disorders. *BMC Med.* 2013;17:133–7.

27. Bradizza CM, Stasiewicz PR, Paas ND. Relapse to alcohol and drug use among individuals diagnosed with co-occurring mental health and substance use disorders: a review. *Clin Psychol Rev.* 2006;26:162–78.
28. Veilleux JC, Skinner KD, Reese ED, Shaver JA. Negative affect intensity influences drinking to cope through facets of emotion dysregulation. *Pers Individ Dif.* 2014;59:96–101.
29. Chandley RB, Luebke AM, Messman-Moore TL, Ward RM. Anxiety sensitivity, coping motives, emotion dysregulation, and alcohol-related outcomes in college women: a moderated-mediation model. *J Stud Alcohol Drugs.* 2014;75:83–92.
30. Buckner JD, Schmidt NB, Lang AR, Small JW, Schlauch RC, Lewinsohn PM. Specificity of social anxiety disorder as a risk factor for alcohol and cannabis dependence. *J Psychiatr Res.* 2008;42:230–9.
31. Hussong AM, Jones DJ, Stein GL, Baucom DH, Boeding S. An internalizing pathway to alcohol use and disorder. *Psychol Addict Behav.* 2011;25:390–404.
32. Mattick RP, Clarke JC. Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behav Res Ther.* 1998;36:455–70.
33. Orsillo SM. (2001). Measures for social phobia. In M. M. Antony, S. M. Orsillo, & L. Roemer (Eds.), *Practitioner's guide to empirically based measures of anxiety* (pp. 165-187). New York: Kluwer Academic/Plenum. 2001.
34. Kim S, Yoon HY, Kwon JH. Validation of the short form of the Korean Social Interaction Anxiety Scale (K-SIAS) and the Korean Social Phobia Scale (K-SPS). *Cognit behav ther in Korea.* 2013;13: 511-535.
35. Watson D, Friend R. Measurement of social-evaluative anxiety. *J Consult Clin Psychol.* 1969;33:448–57.
36. Leary MR. A Brief Version of the Fear of Negative Evaluation Scale. *Pers Soc Psychol Bull.* 1983;9:371–5.
37. Lee J, Choi C. A study of the reliability and the validity of the Korean versions of Social Phobia Scales (K-SAD, K-FNE). *Korean Journal of Clinical Psychology.* 1997;16:251–64.
38. Reiss S, Peterson RA, Gursky DM, McNally RJ. Anxiety sensitivity, anxiety frequency and the prediction of fearfulness. *Behav Res Ther.* 1986;24:1–8.
39. Taylor S, Cox BJ. Anxiety sensitivity: multiple dimensions and hierarchic structure. *Behav Res Ther.* 1998;36:37–51.
40. Taylor S, Zvolensky MJ, Cox BJ, Deacon B, Heimberg RG, Ledley DR, et al. Robust dimensions of anxiety sensitivity: development and initial validation of the Anxiety Sensitivity Index-3. *Psychol Assess.* 2007;19:176–88.
41. Lim Y-J, Kim J-H. Korean Anxiety Sensitivity Index-3: its factor structure, reliability, and validity in non-clinical samples. *Psychiatry Investig.* 2012;9:45–53.
42. Newman MG, Kachin KE, Zuellig AR, Constantino MJ, Cashman-McGrath L. The social phobia diagnostic questionnaire: preliminary validation of a new self-report diagnostic measure of social phobia. *Psychol Med.* 2003;33:623–35.
43. Kim S., Kim H, Newman MG, Kwon JH, Yoon, HY. Validation of the Korean version of the Social Phobia Diagnostic Questionnaire (K-SPDQ). Paper presented at the Poster presented at the 27th Annual Convention of Association for Psychological Science in New York, NY, USA. 2015.
44. Ha J, Tak J. (1998). Validation and Development of the Drinking Motives Questionnaire. *Student Life Study, Kwangwoon university,* 1998;9: 57-79.

45. Gratz KL, Roemer L. Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. *J Psychopathol Behav Assess*. 2004;26:41–54.
46. Cho Y. Assessing emotion dysregulation: Psychometric properties of the Korean version of the Difficulties in Emotion Regulation Scale. *Korean Journal of Clinical Psychology*. 2007;26:1015–38.
47. Babor TF, Grant M. From clinical research to secondary prevention: International collaboration in the development of the Alcohol Disorders Identification Test (AUDIT). *Alcohol Health Res World*. 1989. <https://go.galegroup.com/ps/i.do?id=GALE%7CA8276942&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=0090838X&p=AONE&sw=w>
48. Lee BO, Lee CH, Lee PG, Choi MJ, Namkoong K. Development of Korean version of alcohol use disorders identification test (AUDIT-K): Its reliability and validity. *J Korean Acad Addict Psychiatry*. 2000;4:83–92.
49. Wu AD, Zumbo BD. Understanding and Using Mediators and Moderators. *Soc Indic Res*. 2007;87:367.
50. Preacher KJ, Rucker DD, Hayes AF. Addressing Moderated Mediation Hypotheses: Theory, Methods, and Prescriptions. *Multivariate Behav Res*. 2007;42:185–227.
51. Browne MW, Cudeck R. Alternative Ways of Assessing Model Fit. *Sociol Methods Res*. 1992;21:230–58.
52. Hair JF, Black WC, Babin BJ, Anderson RE, Tatham RL, Others. *Multivariate data analysis (Vol. 6)*. 2006.
53. Russell DW, Kahn JH, Spoth R, Altmaier EM. Analyzing data from experimental studies: A latent variable structural equation modeling approach. *J Couns Psychol*. 1998;45:18–29.
54. Shrout PE, Bolger N. Mediation in experimental and nonexperimental studies: new procedures and recommendations. *Psychol Methods*. 2002;7:422–45.
55. Ping RA Jr. Latent Variable Regression: A Technique for Estimating Interaction and Quadratic Coefficients. *Multivariate Behav Res*. 1996;31:95–120.
56. Lewis BA, O'Neill HK. Alcohol expectancies and social deficits relating to problem drinking among college students. *Addict Behav*. 2000;25:295–9.
57. Buckner JD, Eggleston AM, Schmidt NB. Social anxiety and problematic alcohol consumption: the mediating role of drinking motives and situations. *Behav Ther*. 2006;37:381–91.
58. Terlecki MA, Ecker AH, Buckner JD. College drinking problems and social anxiety: The importance of drinking context. *Psychol Addict Behav*. 2014;28:545–52.
59. Cloninger CR. A systematic method for clinical description and classification of personality variants. A proposal. *Arch Gen Psychiatry*. 1987;44:573–88.
60. Cloninger CR, Sigvardsson S, Bohman M. Type I and type II alcoholism: An update. *Alcohol Health Res World*. 1996;20:18–23.
61. Zucker RA. *The four alcoholisms: a developmental account of the etiologic process*. Paper presented at the Nebraska symposium on motivation. 1986.
62. de Sousa Uva MC, de Timary P, Cortesi M, Mikolajczak M, de Blicquy P du R, Luminet O. Moderating effect of emotional intelligence on the role of negative affect in the motivation to drink in alcohol-dependent subjects undergoing protracted withdrawal. *Pers Individ Dif*. 2010;48:16–21.
63. Riley H, Schutte NS. Low emotional intelligence as a predictor of substance-use problems. *J Drug Educ*. 2003;33:391–8.

64. Kushner MG, Abrams K, Borchardt C. The relationship between anxiety disorders and alcohol use disorders: a review of major perspectives and findings. *Clin Psychol Rev.* 2000;20:149–71.
65. Bacon AK, Ham LS. Attention to social threat as a vulnerability to the development of comorbid social anxiety disorder and alcohol use disorders: an avoidance-coping cognitive model. *Addict Behav.* 2010;35:925–39.
66. DeMartini KS, Carey KB. The role of anxiety sensitivity and drinking motives in predicting alcohol use: a critical review. *Clin Psychol Rev.* 2011;31:169–77.

Figures

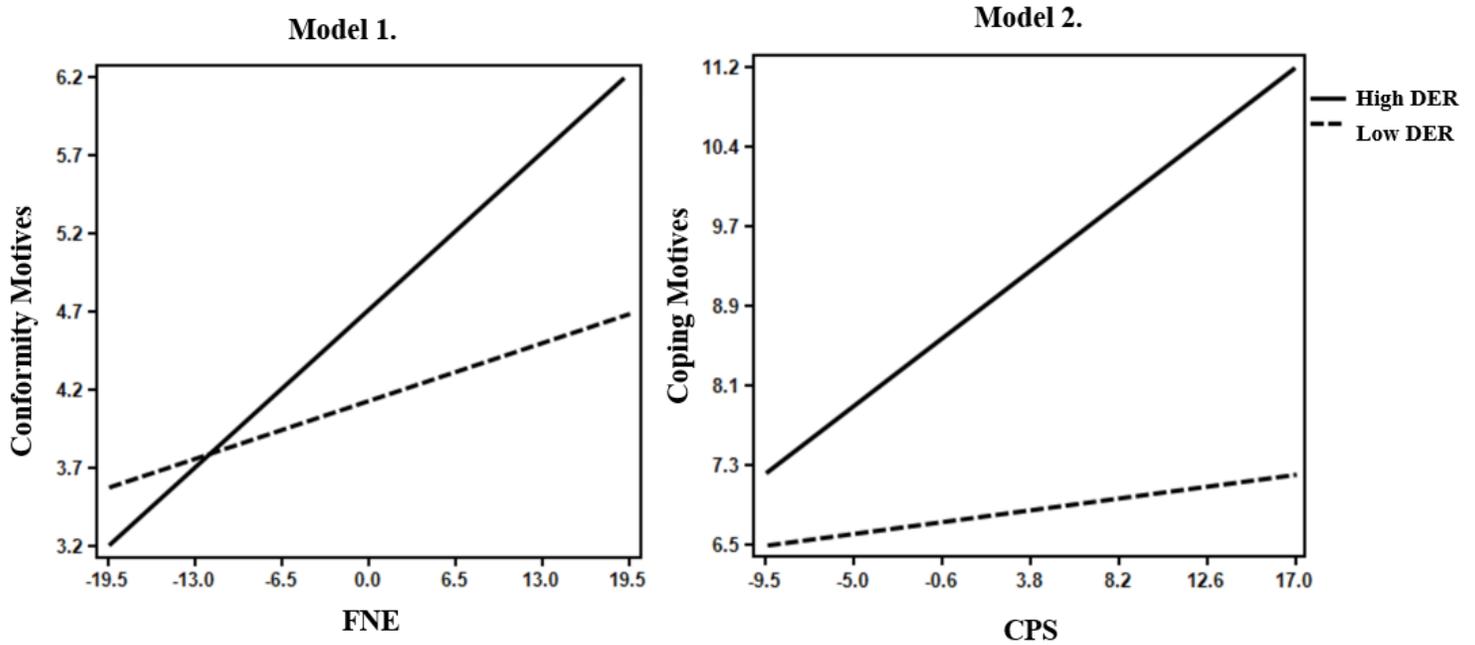


Note. SA: Social anxiety; FNE: Fear of negative evaluation; CPS: Concerns over physiological symptoms; ARP: Alcohol related problems.

** $p < .01$. *** $p < .001$.

Figure 1

Mediation model of social anxiety specific symptoms and coping and conformity motives



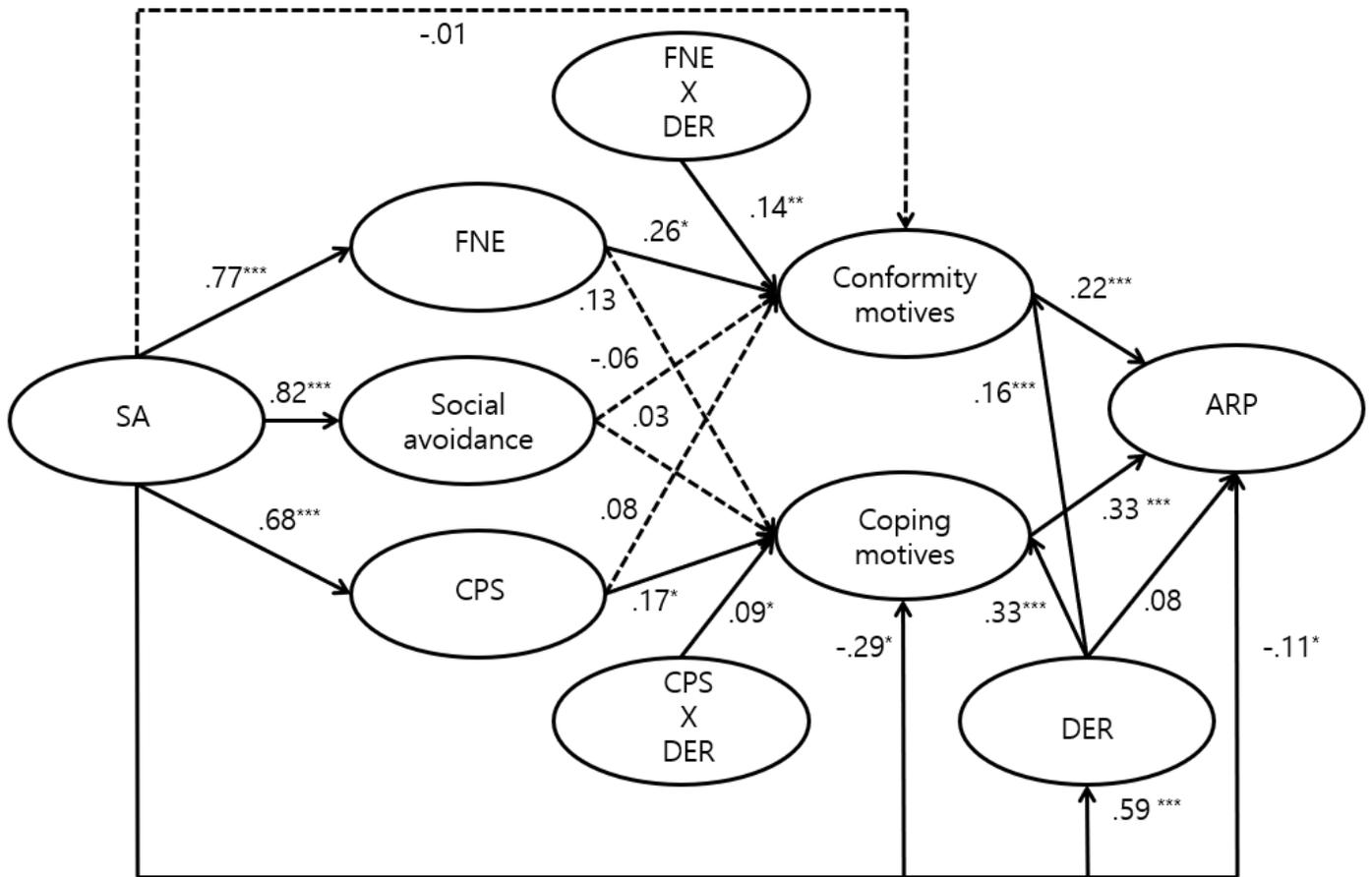
Note. FNE: Fear of negative evaluation; CPS: Concerns over physiological symptoms; DER: Difficulties in emotion regulation

Model 1. Moderation effect of DER in the relationship between FNE and conformity motives

Model 2. Moderation effect of DER in the relationship between CPS and coping motives

Figure 2

Moderation effect of difficulties in emotion regulation in the relationship between social anxiety specific symptoms and coping and conformity motives.



Note. SA: Social anxiety; FNE: Fear of negative evaluation; CPS: Concerns over physiological symptoms; DER: Difficulties in emotion regulation; ARP: Alcohol related problems.
 $* p < .05$. $** p < .01$. $*** p < .001$.

Figure 3

Results from examination of the moderated mediation model