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Sleep Difficulties and Alcohol Use Motives in Female Rape Victims With Posttraumatic Stress Disorder

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Abstract

The purpose of this study was to assess the relationship between sleep difficulties and drinking motives in female rape victims with posttraumatic stress disorder (PTSD). Seventy-four participants were assessed for PTSD symptoms, depression, sleep difficulties, and drinking motives. Results demonstrated that neither PTSD symptoms nor depression were related to any motives for using alcohol. On the other hand, after controlling for education, sleep difficulties were significantly related to drinking motives for coping with negative affect, but not pleasure enhancement or socialization. The findings suggest that sleep difficulties may be an important factor contributing to alcohol use in rape victims with PTSD.

Keywords

sleep; alcohol; coping; PTSD; depression

Epidemiological studies of community samples of women have shown a strong association between history of violent assault and substance use disorders (Cottler, Compton, Mager, Spitznagel, & Janca, 1992; Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997). Other studies show high rates of alcohol abuse among women with a sexual or physical abuse history (Briere & Zaidi, 1989; Swett, Cohen, Surrey, Compaine, & Chavez, 1991) in addition to high rates of victimization history in samples of women with alcoholism (Cohen & Densen-Gerber, 1982; Miller, Downs, & Testa, 1993) and other substance use problems (Dansky, Saladin, Brady, Kilpatrick, & Resnick, 1995; Miller, Downs, Gondoli, & Keil, 1987). There is some evidence that more severe levels of sexual or physical abuse appear associated with a significantly greater risk for alcohol problems (Polusny & Follette, 1995; Schaefer, Evans, & Sterne, 1985). The positive correlations between trauma severity and alcohol problems may be due to posttraumatic stress disorder (PTSD), which is associated with both severity of trauma and alcohol abuse (Stewart, 1996). Consistent with this, studies with rape victims diagnosed with PTSD report high lifetime (28–39%) and current (5–14%) rates of substance use disorders in this population (Cashman, Molnar, & Foa, 1995; Resick, Griffin, & Mechanic, 1996).

One explanation for the high rates of substance use disorders in persons with PTSD is that people use substances in an attempt to regulate negative affect (Kilpatrick, Edmunds, & Seymour, 1992) related to sleep disturbances (Keane, Gerardi, Lyons, & Wolfe, 1988). Sleep

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problems are fundamental to PTSD (Cottler et al., 1992; Kramer, Schoen, & Kinney, 1987; Ross, Ball, Sullivan, & Caroff, 1989), and such disturbances are a criterion for the diagnosis of PTSD in *DSM-III-R* and *DSM-IV* (American Psychiatric Association, 1987, 1994). The use of alcohol as a hypnotic/sedative for promoting sleep (Webb & Agnew, 1973) may be driven by the fact that in the short term, alcohol improves sleep by decreasing sleep latency, increasing sleep duration, and minimizing nightmares through REM and Stage 4 sleep suppression (Porkorny, 1978). These short-term effects of alcohol ingestion may act as a powerful reinforcer that maintains drinking behavior for fostering improved sleep (Krystal, 1984; LaCoursiere, Godfrey, & Ruby, 1980).

Research examining cognitive variables, that play an important role in an individual's decision to use a specific drug, has shown that although enhancement motives are strongly associated with a pattern of frequent, heavy drinking, coping motives are associated with frequent but not substantially heavier drinking (Cooper, Russell, Skinner, & Windle, 1992). Despite heavier consumption associated with enhancement motives, coping motives have been found to be more strongly predictive of symptoms of abusive drinking. Finally, whereas both enhancement and social motives are associated with drinking in social contexts, coping motives are more highly associated with drinking alone.

Although both sleep difficulties and alcohol use disorders are common in persons with PTSD, research has not examined whether specific motives for alcohol use are associated with sleep difficulties. This study sought to assess the relationship of sleep difficulties to alcohol drinking motives in a treatment seeking sample of female rape victims diagnosed with PTSD. It was hypothesized that sleep difficulties would be uniquely predictive of coping motives for drinking and not motives for enhancement of positive affect or socialization.

Method

Participants

The participants were drawn from a pool of 190 rape victims who called in to participate in a federally funded treatment outcome study for chronic PTSD. Of these women, 73 were screened out with a phone screen because they met exclusionary criteria which included *DSM-III-R* diagnoses of an organic mental disorder, schizophrenia, mood disorder with psychotic features, and current substance use disorder. Participants who had recently begun to take medications, were currently in a violent relationship, or were acutely suicidal were also excluded. Of the 117 women who came into the study for a pretreatment assessment, 16 were screened out because they were either PTSD-negative or had severe competing life stressors. Of the remaining 101 women, the first 74 were administered and completed the assessment for drinking motives.

All 74 participants met criteria for PTSD on the Clinician Administered PTSD Scale (CAPS; Blake et al., 1990). Fifty-two (70%) of these participants also met criteria for lifetime depressive disorder and 28 (38%) met criteria for current depressive disorder. Thirty-two (43%) of these participants met criteria for lifetime alcohol use disorders, and 33 (45%) participants met criteria for lifetime drug use disorders (SCID-III-R; Spitzer, Williams, Gibbon, & First, 1987).

Because current substance use disorder was used as an exclusionary criterion for the treatment study, only current alcohol use was assessed and reported for the sample. Regarding current alcohol use, 39 (53%) women endorsed weekly use, with 20 (27%) of these 39 women endorsing an average use of 3.6 drinks per day (range: 0.1–20 drinks per day). Another 22 (30%) of the women endorsed lifetime, and no current, alcohol use. Finally, about 11 (15%)

of the women endorsed no current or lifetime use of alcohol. Data on alcohol use history for the remaining 2 (2%) women were missing.

The average age of the participants was 33 years (range: 18–72 years) with an average time of 10 years elapsed between the rape and seeking treatment. The average number of years of education was 14 (range: 2–20). Regarding income per year, 28 (38%) participants made less than \$10,000, 26 (35%) made between \$10,000–30,000, and 17 (23%) made more than \$30,000. Data on 3 (4%) participants were missing. On marital status, 53 (72%) were single or divorced, and 18 (23%) were married or living with a partner. Data on 3 (4%) participants were missing. The racial distribution of participants was 56 (76%) Caucasians, 12 (16%) African Americans, and six (8%) others.

Measures

Clinician Administered PTSD Scale (CAPS; Blake et al., 1990)—The CAPS is a 30-item structured diagnostic interview for assessing *DSM-III-R* related PTSD symptoms. Kappa for the overall PTSD diagnosis in this sample was .74 with 92% interrater agreement.

Structured Clinical Interview for DSM-III-R (SCID-III-R; Spitzer et al., 1987)—The SCID-III-R is a structured diagnostic interview that was used for assessing *DSM-III-R* criteria for major depression and substance use disorders. Kappas for all diagnoses ranged from .80 to 1.00.

PTSD Symptom Scale (PSS; Foa, Riggs, Dancu, & Rothbaum, 1993)—The PSS consists of 17 self-report items that correspond with the symptoms of the *DSM-III-R* (American Psychiatric Association, 1987) diagnostic criteria for PTSD (total range 0–51). Interrater reliability of the PSS is high (.90 κ ; Rothbaum, Foa, Murdock, Riggs, & Walsh, 1990).

Beck Depression Inventory: (BDI; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961)—The BDI is a 21-item, self-report inventory that evaluates cognitive and vegetative symptoms of depression (total range 0–63). The test-retest reliability for the BDI in psychiatric patients ranges from .46 to .86 with .65 reported for test-retest reliability over a 1-week period for depressed patients (Beck, Steer, & Garbin, 1988).

Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989)—The PSQI is a self-rated questionnaire that assesses sleep difficulties over a 1-month time interval. Nineteen individual items generate seven “component” scores: subjective sleep quality (PSQI1), sleep latency (PSQI2), sleep duration (PSQI3), habitual sleep efficiency (PSQI4), sleep disturbances (PSQI5), use of sleeping medication (PSQI6), and daytime dysfunction (PSQI7). The sleep disturbances component includes items that assess middle and early morning awakenings and nightmare frequency (total range: 0–57). The test-retest reliability for the PSQI has been found to be .85. A global PSQI score >5 has yielded a diagnostic sensitivity of 89.6% and specificity of 86.5% ($\kappa = .75$) in distinguishing good and poor sleepers (Buysse et al., 1989).

Drinking Motives Measure (DMM; Cooper, Russell, Skinner, & Windle, 1992)—The drinking motives questionnaire is a measure that assesses motives for lifetime or current use of alcohol. It is a 15-item self-report instrument that measures three drinking motives: coping with negative affect, enhancing positive affect, and social motives (total range: 15–60). Internal consistency estimates of reliability (alpha coefficients) are .80 to .81 for coping motives, .84 to .86 for enhancement motives, and .76 for social motives (Cooper et al., 1992).

Procedure and Statistical Analyses

Participants who gave informed consent were administered the CAPS and the SCID-III-R followed by the self-report measures. The sleep items in the PSS and the BDI were removed to eliminate overlap of the PSS and BDI with the PSQI. Correlations were computed to determine the inter-relationships among the variables. Results from the correlational analyses were used to drive the hierarchical multiple regression analyses conducted to determine whether sleep difficulties uniquely predicted alcohol drinking motives after controlling for demographic variables and PTSD and depression symptoms without the sleep items.

Results

The mean PTSD score on the PSS for the entire sample was 28.84 ($SD = 9.68$) indicating severe PTSD. The mean depression score on the BDI was 22.37 ($SD = 8.89$) indicating moderate to severe depression. On the PSQI, the mean score for subjective sleep quality was 1.75 ($SD = .81$), for sleep latency 1.92 ($SD = 1.01$), for sleep duration 1.55 ($SD = 1.04$), for habitual sleep efficiency 1.12 ($SD = 1.21$), for sleep disturbances 1.72 ($SD = .62$), for use of sleeping medication .63 ($SD = 1.04$), and for daytime dysfunction was 1.78 ($SD = .73$). Although difficulties in the area of use of sleep medication were mild, the PSQI scores reflected moderate sleep difficulties in all other areas of sleep functioning (Table 1).

In the first series of analyses, zero order correlations were computed among the variables (Table 2). Regarding demographics, the correlational analyses showed a significant negative correlation between education and all three drinking motives for coping with negative affect, pleasure enhancement, and socialization. However, neither PTSD nor depression symptom scores, computed without the sleep items, were significantly correlated with any of the drinking motives. The sleep disturbances component of sleep difficulties was significantly related to drinking for coping with negative affect. Further, the subjective sleep quality and sleep duration components showed a significant negative correlation with drinking for socialization. None of the sleep difficulties components were significantly related to drinking for pleasure enhancement.

The goal of the multiple regression analyses was to determine the unique contribution of sleep difficulties in explaining drinking motives after controlling for demographic variables, and PTSD and depression symptom scores. The first set of multiple regression analyses was conducted to explain variance in drinking coping motives. Because education was the only demographic variable that was significantly correlated with drinking coping motives, it was entered in Step 1. The goal in the second step was to enter the revised PTSD and depression symptom scores followed by the sleep difficulties variables in Step 3. However, because neither PTSD nor depression symptom scores were related to the drinking coping motives, they were not entered in Step 2. Instead, a decision was made to enter the sleep disturbances component of the sleep difficulty variable in Step 3. It should be noted that this was the only sleep difficulty component that was significantly related to drinking coping motives. The results from these analyses showed that after controlling for education in Step 1, sleep disturbances, entered in Step 2, predicted a significant amount of unique variance in drinking coping motives (Table 3).

The second set of multiple regression analyses was conducted to explain variance in drinking socialization motives. Because education was the only demographic variable that was significantly correlated with drinking socialization motives, it was entered in Step 1. Again, because neither PTSD nor depression symptom scores were related to the drinking socialization motives, they were not entered in Step 2. Instead, the subjective sleep quality and the sleep duration components of the sleep difficulty variable were entered in Step 3. It should be noted that these were the only sleep difficulty components that were significantly related to drinking

socialization motives. The results from these analyses showed that neither subjective sleep quality or sleep duration, entered in Step 2, predicted unique variance in socialization motives after controlling for education in Step 1 (Table 4). Regression analyses with pleasure enhancement motives were not conducted because none of the sleep difficulty components were related to these motives.

Discussion

The results support findings from other studies that suggest that coping motives may play a role in maintaining both alcohol and marijuana use in victims of rape with PTSD (Frank, Turner, Stewart, Jacob, & West, 1981; Kilpatrick et al., 1992; Miller et al., 1987). The PTSD and depression symptoms, other than those related to sleep disturbances, were not related to coping motives. Thus, rape victims with PTSD may drink alcohol to regulate negative affect related to their sleep disturbances and nightmares, but not to deal with either anxiety related to reexperiencing of the trauma or heightened arousal.

These findings have treatment implications because alcohol use may work in the short term to suppress REM sleep and thereby limit the frequency and intensity of PTSD-related nightmares (Krystal, 1984; LaCoursiere et al., 1980). However, withdrawal from alcohol can cause a REM rebound effect during which frightening nightmares are frequent (Pokorny, 1978). Given that avoidance of trauma-related cues form a major part of the PTSD symptom spectrum and alcohol may often be used to achieve this goal, it becomes important that in therapy the client be educated about the short- and long-term effects of alcohol, and be trained in alternative methods of coping with negative affect.

Two caveats about this study require consideration. First, only slightly more than half the sample was endorsing current alcohol use on a weekly basis. Further, participants with alcohol use disorder were excluded from this study resulting in omission of those persons with the heaviest alcohol use. This is potentially important because alcohol expectancies tend to be related to the dosage of alcohol consumed (Brown, Goldman, Inn, & Anderson, 1980; Southwick, Steele, Marlatt, & Lindell, 1981). To the extent that coping motives would be expected to be associated with heavier amounts of alcohol consumption, this bias would have tended to decrease any association between drinking for coping and sleep problems. Thus, this study may have underestimated the importance of drinking as a coping strategy for managing sleep disturbances in persons with PTSD.

On the other hand, it is also entirely possible that persons who were excluded for heavier amounts of alcohol consumption might have clustered at the pole of extreme sleep disturbances thereby reducing the linear association between the two variables. The exclusion of heavy alcohol consumers, thus, may have increased the strength of the relationship between sleep disturbances and coping motives for drinking alcohol. Furthermore, all the women in this study met criteria for PTSD, constraining the range of PTSD symptom severity scores. It is possible that stronger associations between PTSD symptom severity and motives for alcohol use would emerge in samples of participants not limited to people meeting diagnostic criteria for PTSD.

In conclusion, the findings suggest that alcohol use problems in sexual assault victims with PTSD may be maintained by specific motives for coping with sleep disturbances that are a characteristic symptom of PTSD. However, the association between drinking coping and sleep disturbances could reflect the disruptive effects of alcohol on sleep as well. The small sample size and the correlational nature of the data precluded any determination of directionality in these relationships. Although the findings suggest that sleep disturbances are an important factor that may motivate persons with PTSD to use alcohol as a strategy for coping with sleep problems, the directionality of these relationships might be better teased apart by conducting

more sophisticated statistical analyses like structural equation modeling with larger sample sizes.

Because neither PTSD nor depression were significantly related to motives for using alcohol, this findings also underscore the importance of specifically assessing sleep disturbances in people with PTSD. It has been suggested that treating victim's PTSD might address some of their alcohol use problems (Kilpatrick, Resnick, Saunders, & Best, 1994) potentially by normalizing their sleep. It may, therefore, be important to address substance use expectancies and motives when treating sleep difficulties that form an integral part of PTSD and depressive disorder symptomatology.

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References

- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 3. Washington DC: American Psychiatric Press; 1987.
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4. Washington DC: American Psychiatric Press; 1994.
- Beck AT, Steer RA, Garbin MG. Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review* 1988;8:77–100.
- Beck AT, Ward CH, Mendelsohn M, Mock J, Erbaugh J. An inventory for measuring depression. *Archives of General Psychiatry* 1961;4:561–571. [PubMed: 13688369]
- Blake DD, Weathers FW, Nagy LM, Kaloupek DG, Klauminzer G, Charney DS, Keane TM. A clinician rating scale for assessing current and lifetime PTSD: The CAPS-1. *The Behavior Therapist* 1990;18:187–188.
- Briere J, Zaidi LY. Sexual abuse histories and sequelae in female psychiatric emergency room patients. *American Journal of Psychiatry* 1989;146:1602–1606. [PubMed: 2589554]
- Brown SA, Goldman MS, Inn A, Anderson LR. Expectations of reinforcement from alcohol: Their domain and relation to drinking patterns. *Journal of Consulting and Clinical Psychology* 1980;48:419–426. [PubMed: 7400427]
- Buyse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatric Research* 1989;28:193–213.
- Cashman, L.; Molnar, C.; Foa, EB. Comorbidity of DSM-III-R axis I and axis II disorders with acute and chronic post traumatic stress disorder. Paper presented at the 29th Annual Association for Advancement of Behavior Therapy Convention; Washington, DC. 1995 Nov.
- Cohen FS, Densen-Gerber JD. A study of the relationship between child abuse and drug addictions in 178 patients: Preliminary results. *Child Abuse and Neglect* 1982;6:383–387. [PubMed: 6892324]
- Cooper ML, Russell M, Skinner JB, Windle M. Development and validation of a three-dimensional measure of drinking motives. *Psychological Assessment* 1992;4:123–132.
- Cottler LB, Compton WM III, Mager D, Spitznagel EL, Janca A. Posttraumatic stress disorder among substance users from the general population. *American Journal of Psychiatry* 1992;149:664–670. [PubMed: 1575258]
- Dansky BS, Saladin ME, Brady KT, Kilpatrick DG, Resnick HS. Prevalence of victimization and posttraumatic stress disorder among women with substance use disorders: Comparison of telephone and in-person assessment samples. *The International Journal of the Addictions* 1995;30:1079–1099. [PubMed: 7591350]
- Foa EB, Riggs DS, Dancu CV, Rothbaum BO. Reliability and validity of a brief instrument for assessing post-traumatic stress disorder. *Journal of Traumatic Stress* 1993;6:459–473.

- Frank E, Turner SM, Stewart BD, Jacob M, West D. Past psychiatric symptoms and the response to sexual assault. *Comprehensive Psychiatry* 1981;22:479–487. [PubMed: 7187868]
- Keane, TM.; Gerardi, RJ.; Lyons, JA.; Wolfe, J. The interrelationship of substance abuse and posttraumatic stress disorder. Epidemiological and clinical considerations. In: Galanter, M., editor. *Recent developments in alcoholism*. Vol. 6. New York: Plenum; 1988. p. 27–48.
- Kilpatrick DG, Acierno R, Resnick HS, Saunders BE, Best CL. A 2-year longitudinal analysis of the relationships between violent assault and substance use in women. *Journal of Consulting and Clinical Psychology* 1997;65:834–847. [PubMed: 9337502]
- Kilpatrick, DG.; Edmunds, CN.; Seymour, AK. *Rape in America: A report to the nation*. Arlington, VA: National Victim Center, Washington, DC; 1992.
- Kilpatrick, DG.; Resnick, HS.; Saunders, BE.; Best, CL. Victimization, post traumatic stress disorder, and substance use/abuse among women. Paper presented at the NIDA Director's Conference on Drug Addiction Research and Health of Women; Washington, DC. 1994 Sep.
- Kramer M, Schoen LS, Kinney L. Nightmares in Vietnam veterans. *Journal of the American Academy of Psychoanalysis* 1987;15:67–81. [PubMed: 3570909]
- Krystal, H. Psychoanalytic views on human emotional damages. In: Van der Kolk, BA., editor. *Posttraumatic stress disorder: Psychological and biological sequelae*. Washington, DC: American Psychiatric Press; 1984. p. 1–28.
- LaCoursiere RB, Godfrey KE, Ruby LM. Traumatic neurosis in the etiology of alcoholism: Vietnam and other trauma. *American Journal of Psychiatry* 1980;137:966–968. [PubMed: 7416301]
- Miller BA, Downs WR, Gondoli DM, Keil A. The role of childhood sexual abuse in the development of alcoholism among women. *Violence and Victims* 1987;2:157–172. [PubMed: 3154163]
- Miller BA, Downs WR, Testa M. Inter-relationships between victimization experiences and women's alcohol use. *Journal of Studies on Alcohol* 1993;11:109–117.
- Pokorny, AD. Sleep disturbances, alcohol, and alcoholism: A review. In: Williams, RL.; Karacan, I., editors. *Sleep disorders: Diagnosis and treatment*. New York: Wiley; 1978.
- Polusny MA, Follette VM. Long-term correlates of child sexual abuse: Theory and review of the empirical literature. *Applied and Preventive Psychology* 1995;4:143–166.
- Resick, PA.; Griffin, MG.; Mechanic, MB. Sequelae of trauma: Beyond PTSD. Keynote address at the Annual Conference of the British Association for Behavioural and Cognitive Psychotherapies; Southport, England. 1996 Jul.
- Ross RJ, Ball WA, Sullivan KA, Caroff SN. Sleep disturbance as the hallmark of posttraumatic stress disorder. *American Journal of Psychiatry* 1989;146:697–707. [PubMed: 2658624]
- Rothbaum BO, Foa EB, Riggs DS, Murdock T, Walsh W. A prospective examination of post-traumatic stress disorder in rape victims. *Journal of Traumatic Stress* 1992;5:455–475.
- Schaefer S, Evans S, Sterne M. Incest among women in recovery from alcoholism and drug dependency: Correlation and implication for treatment [Summary]. *Proceedings of the International Congress on Alcoholism and Drug Dependence* 1985;34:368–369.
- Southwick LL, Steele CM, Marlatt GA, Lindell M. Alcohol related expectancies: Defined by phase of intoxication and drinking experience. *Journal of Consulting and Clinical Psychology* 1981;49:713–721. [PubMed: 7287981]
- Spitzer, RL.; Williams, JBW.; Gibbon, M.; First, M. *Structured Clinical Interview for DSM-III-R-Patient Edition*. New York State Psychiatric Institute: Biometrics Dept; 1987.
- Stewart SH. Alcohol abuse in individuals exposed to trauma: A critical review. *Psychological Bulletin* 1996;120:83–112. [PubMed: 8711018]
- Swett C Jr, Cohen C, Surrey J, Compaine A, Chavez R. High rates of alcohol use and history of physical and sexual abuse among women outpatients. *American Journal of Drug and Alcohol Abuse* 1991;17:49–60. [PubMed: 2038983]
- Webb, W.; Agnew, HW. *Sleep and dreams*. Dubuque: William C. Brown; 1973.

Table 1

Prevalence of Nighttime Sleep Difficulties on the Pittsburgh Sleep Quality Index

Sleep difficulties	None to mild (%)	Moderate (%)	Severe (%)
Sleep quality	42	38	20
Sleep latency	30	36	34
Sleep duration	49	28	23
Sleep efficiency	65	13	22
Sleep disturbances	34	58	8
Insomnia	13	29	58
Nightmares	35	40	25
Micturation frequency	25	29	46
Breathing problems	72	15	13
Cough and snore	73	12	15
Being too cold	51	25	24
Being too hot	57	24	19
Physical pain	68	17	15
Sleep medication	80	8	12
Daytime dysfunction	37	47	16

Table 2

Zero-Order Correlations among Education, PTSD Symptoms, Depression, Sleep Difficulties, and Drinking Motives ($N = 74$)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
Education	1.00												
PTSD symptoms	.19	1.00											
Depression symptoms	-.02	.57**	1.00										
Subjective sleep quality (PSQI1)	.08	.50**	.54**	1.00									
Sleep latency (PSQI2)	.19	.40**	.15	.38**	1.00								
Sleep duration (PSQI3)	.15	.30**	.29*	.59**	.32**	1.00							
Habitual sleep efficiency (PSQI4)	.03	.37**	.37**	.43**	.43**	.66**	1.00						
Sleep disturbances (PSQI5)	-.03	.27*	.45**	.27*	.14	.29*	.27*	1.00					
Use of sleep medication (PSQI6)	.04	.12	.22	.07	.12	.02	.25*	.28*	1.00				
Daytime dysfunction (PSQI7)	.08	.35**	.37**	.26*	.17	.28*	.21	.43**	.09	1.00			
Drinking coping motives	-.32**	.10	.20	.01	-.06	-.08	.11	.35**	.05	.15	1.00		
Drinking enhancement motives	-.37**	-.16	-.05	-.15	-.12	-.12	-.11	.13	-.12	.02	.75**	1.00	
Drinking socialization motives	.30**	-.19	-.14	-.25*	-.13	-.30**	-.21	-.08	-.11	-.01	.59**	.77**	1.00

Note. PSQI – Pittsburgh Sleep Quality Index.

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

Table 3
Hierarchical Multiple Regression for Prediction of Drinking Coping Motives ($N = 74$)

Predictor	B	SE B	β	Step ΔR^2	Total R^2
Step 1: Demographics				.17**	17%
Education	-.48	.13	-.41**		
Step 2: Sleep difficulties				.12**	29%
Education	-.47	.12	-.40**		
Sleep disturbances	2.15	.65	.35**		

**
 $p < .01$.

Table 4
Hierarchical Multiple Regression for Prediction of Drinking Socialization Motives ($N = 74$)

Predictor	B	SE B	β	Step ΔR^2	Total R^2
Step 1: Demographics				.08*	08%
Education	-.32	.13	-.28*		
Step 2: Sleep difficulties				.09*	17%
Education	-.28	.13	-.24*		
Subjective sleep quality	-.76	.67	-.16		
Sleep duration	-.71	.52	-.19		

* $p < .05$.