

Supplemental Table 1. *Alcohol use disorder symptom frequencies (N=159).*

Alcohol Use Disorder Symptom	<i>n</i>	%
1. Withdrawal	2	1.26
2. Tolerance	33	20.75
3. Time spent	21	13.21
4. Give up activities	1	0.63
5. Craving	7	4.40
6. Quit/cut down	8	5.03
7. Larger/Longer	29	18.24
8. Social/interpersonal problems	5	3.14
9. Hazardous use	13	8.18
10. Physical/psychological problems	13	8.18
11. Failure to Fulfill	6	3.77

Note. AUD symptoms include: (1) alcohol-related withdrawal (withdrawal); (2) alcohol tolerance (tolerance); (3) a great deal of time spent obtaining, using, or recovering from alcohol (time spent); (4) important activities given up or reduced because of alcohol (give up); (5) craving or a strong desire to use alcohol (craving); (6) persistent desire or unsuccessful attempts to cut down or control alcohol use (quit/cut down); (7) drinking more or longer than intended (larger/longer); (8) continued alcohol use despite social or interpersonal problems (social problems); (9) recurrent use in hazardous situations (hazardous use); (10) continued alcohol use despite physical or psychological problem that is caused or made worse by alcohol (physical/psychological); (11) failure to fulfill role obligations due to recurrent alcohol use (failure to fulfill).

Supplemental Table 2. *Young Adult Alcohol Problems Screening Test exploratory factor analysis in baseline sample (N = 192).*

Item	Factors	
	Hazardous use/ Impairment	Role interference
Have you driven a car when you knew you had too much to drink to drive safely?	0.32	-0.01
Have you had a headache (hangover) in the morning after you had been drinking?	0.07	0.19
Have you felt very sick to your stomach or thrown up after drinking?	0.07	0.29
Have you showed up late for work or school because of drinking, a hangover, or an illness caused by drinking?	-0.06	0.78
Have you not gone to work or missed classes at school because of drinking, a hangover, or an illness caused by drinking?	0.02	0.77
Have you gotten into physical fights when drinking?	0.61	-0.03
Have you ever gotten into trouble at work or school because of drinking?	0.41	0.24
Have you ever been fired from a job or suspended or expelled from school because of your drinking?	-	-
Have you damaged property, set off a false alarm, or other things like that after you had been drinking?	0.57	0.03
Has your boyfriend/girlfriend (or spouse), parent(s), or other near relative ever complained to you about your drinking?	0.64	0.05
Has your drinking ever created problems between you and your boyfriend/girlfriend (or spouse) or another near relative?	0.74	-0.06
Have you ever lost friends (including boyfriends or girlfriends) because of your drinking?	-	-
Have you ever neglected your obligations, your family, your work, or schoolwork for two or more days in a row because of your drinking?	0.09	0.31
Has drinking ever gotten you into sexual situations you later regretted?	0.02	0.32
Have you ever received a lower grade on an exam or paper than you should have because of your drinking?	0.17	0.32
Have you ever been arrested for drunk driving, driving while intoxicated, or driving under the influence of alcohol?	-	-
Have you ever been arrested, even for a few hours, because of other drunken behaviors?	-	-
Have you awakened the morning after a good bit of drinking and found that you could not remember a part of the evening before?	0.16	0.35
Have you ever had "the shakes" after stopping or cutting down on drinking (for example, your hands shake so that your coffee cup rattles in the saucer or you have trouble lighting a cigarette)?	0.16	0.26
Have you ever felt like you needed a drink just after you'd gotten up (that is, before breakfast)?	0.13	0.19
Have you ever found you needed larger amounts of alcohol to feel any effect, or that you could no longer get high or drunk on the amount that used to get you high or drunk?	0.15	0.15
Have you ever felt that you needed alcohol or were dependent on alcohol?	-	-
Have you ever felt guilty about your drinking?	0.23	0.22
Has a doctor ever told you that your drinking was harming your health?	-	-
Have you ever gone to anyone for help to control your drinking?	-	-
Have you ever attended a meeting of Alcoholics Anonymous because of concern about your drinking?	-	-
Have you ever sought professional help for your drinking (for example, spoken to a physician, psychologist, psychiatrist, alcoholism counselor, clergyman about your drinking)?	-	-

Note. Bold = highest factor loading. "-" excluded due to low base rate (<2.5% of valid responses).

Supplemental Table 3. *Young Adult Alcohol Problems Screening Test confirmatory factor analysis in baseline sample (N = 192).*

Item	Factors	
	Hazardous use/ Impairment	Role interference
Have you driven a car when you knew you had too much to drink to drive safely?	0.28	
Have you had a headache (hangover) in the morning after you had been drinking?	†	†
Have you felt very sick to your stomach or thrown up after drinking?	†	†
Have you showed up late for work or school because of drinking, a hangover, or an illness caused by drinking?		0.66
Have you not gone to work or missed classes at school because of drinking, a hangover, or an illness caused by drinking?		0.75
Have you gotten into physical fights when drinking?	0.55	
Have you ever gotten into trouble at work or school because of drinking?	0.58	
Have you ever been fired from a job or suspended or expelled from school because of your drinking?	-	-
Have you damaged property, set off a false alarm, or other things like that after you had been drinking?	0.61	
Has your boyfriend/girlfriend (or spouse), parent(s), or other near relative ever complained to you about your drinking?	0.68	
Has your drinking ever created problems between you and your boyfriend/girlfriend (or spouse) or another near relative?	0.68	
Have you ever lost friends (including boyfriends or girlfriends) because of your drinking?	-	-
Have you ever neglected your obligations, your family, your work, or schoolwork for two or more days in a row because of your drinking?		0.32
Has drinking ever gotten you into sexual situations you later regretted?		0.35
Have you ever received a lower grade on an exam or paper than you should have because of your drinking?		0.37
Have you ever been arrested for drunk driving, driving while intoxicated, or driving under the influence of alcohol?	-	-
Have you ever been arrested, even for a few hours, because of other drunken behaviors?	-	-
Have you awakened the morning after a good bit of drinking and found that you could not remember a part of the evening before?		0.46
Have you ever had “the shakes” after stopping or cutting down on drinking (for example, your hands shake so that your coffee cup rattles in the saucer or you have trouble lighting a cigarette)?	†	†
Have you ever felt like you needed a drink just after you’d gotten up (that is, before breakfast)?	†	†
Have you ever found you needed larger amounts of alcohol to feel any effect, or that you could no longer get high or drunk on the amount that used to get you high or drunk?	†	†
Have you ever felt that you needed alcohol or were dependent on alcohol?	-	-
Have you ever felt guilty about your drinking?	†	†
Has a doctor ever told you that your drinking was harming your health?	-	-
Have you ever gone to anyone for help to control your drinking?	-	-
Have you ever attended a meeting of Alcoholics Anonymous because of concern about your drinking?	-	-
Have you ever sought professional help for your drinking (for example, spoken to a physician, psychologist, psychiatrist, alcoholism counselor, clergyman about your drinking)?	-	-

Note. Robust $\chi^2 = 62.87$, $df = 53$, $p = 0.17$; CFI = 0.87; TLI = 0.84; RMSEA = 0.03; SRMR = 0.07. Factors are correlated 0.46. “-” excluded due to low base rate (<2.5% of valid responses). “†” excluded due to low loading on either factor (<.3) or cross loading (>.3) in exploratory factor analysis results (EFA). Although “driven a car when you knew you had too much to drink to drive safely” loaded >.3 on hazardous use/impairment in the EFA, low loading (<.3) here prompted the removal of this item in the estimation of factor scores.

Supplemental Table 4. *Marijuana Problems Index exploratory factor analysis in baseline sample (N = 192).*

Item	Factors	
	Role interference/ Dependence	Physical/ Psychological
Got into fights, acted bad, or did mean things	-	-
Missed out on other things because you spent too much money on marijuana	0.33	0.05
Went to work or school high or stoned	0.67	-0.14
Caused shame or embarrassment to someone	-	-
Neglected your responsibilities	0.70	0.05
Relatives avoided you	-	-
Felt that you needed more marijuana than you used to use in order to get the same effect	0.70	-0.13
Tried to control your marijuana use by trying to smoke marijuana only certain times of day or certain places	0.62	-0.12
Had withdrawal symptoms, that is, felt sick because you stopped or cut down on smoking marijuana	-	-
Noticed a change in your personality	0.03	0.49
Missed a day (or part of a day) of school or work	0.29	0.13
Tried to cut down on smoking marijuana	0.68	-0.17
Suddenly found yourself in a place that you could not remember getting to	-	-
Passed out or fainted suddenly	-	-
Had a fight, argument, or bad feelings with a friend	0.21	0.18
Had a fight, argument, or bad feelings with a family member	-	-
Kept smoking marijuana when you promised yourself not to	0.50	-0.21
Felt you were going crazy	0.20	0.38
Had a bad time	0.46	0.00
Felt physically or physiologically dependent on marijuana	-	-
Was told by a friend or neighbor to stop or cut down on your marijuana use	0.17	0.45
Felt paranoid or overly nervous in everyday life	0.37	0.43
Felt unmotivated to do things you needed to do in your everyday life	0.61	0.35
Lost interest in things you once enjoyed	0.39	0.17
Noticed that your memory was not as good as it used to be	0.74	0.16
Lost some physical coordination in everyday activities	-0.06	0.83
Had trouble thinking clearly in everyday activities	0.56	0.32

Note. Bold = highest factor loading. “-“ excluded due to low base rate (<2.5% of valid responses).

Supplemental Table 5. *Marijuana Problems Index confirmatory factor analysis in baseline sample (N = 192).*

Item	Factors	
	Role interference/ Dependence	Physical/ Psychological
Got into fights, acted bad, or did mean things	-	-
Missed out on other things because you spent too much money on marijuana	.29	
Went to work or school high or stoned	.63	
Caused shame or embarrassment to someone	-	-
Neglected your responsibilities	.68	
Relatives avoided you	-	-
Felt that you needed more marijuana than you used to use in order to get the same effect	.69	
Tried to control your marijuana use by trying to smoke marijuana only certain times of day or certain places	.59	
Had withdrawal symptoms, that is, felt sick because you stopped or cut down on smoking marijuana	-	-
Noticed a change in your personality		.47
Missed a day (or part of a day) of school or work	†	†
Tried to cut down on smoking marijuana	.68	
Suddenly found yourself in a place that you could not remember getting to	-	-
Passed out or fainted suddenly	-	-
Had a fight, argument, or bad feelings with a friend	†	†
Had a fight, argument, or bad feelings with a family member	-	-
Kept smoking marijuana when you promised yourself not to	.40	
Felt you were going crazy	-	-
Had a bad time	.40	
Felt physically or physiologically dependent on marijuana	-	-
Was told by a friend or neighbor to stop or cut down on your marijuana use		.50
Felt paranoid or overly nervous in everyday life	†	†
Felt unmotivated to do things you needed to do in your everyday life	†	†
Lost interest in things you once enjoyed	.38	
Noticed that your memory was not as good as it used to be	.75	
Lost some physical coordination in everyday activities		.85
Had trouble thinking clearly in everyday activities	†	†

Note. Robust $\chi^2 = 79.17$, $df = 64$, $p = 0.10$; CFI = 0.85; TLI = 0.81; RMSEA = 0.04; SRMR = 0.12. Factors are correlated 0.02. “-” excluded due to low base rate (<2.5% of valid responses). “†” excluded due to low loading on either factor (<.3) or cross loading (>.3) in exploratory factor analysis results (EFA). “Felt you were going crazy” loaded >.3 on physical/psychological in the EFA but negative variance for this item prompted the removal of the item from the CFA. Although “Missed out on other things because you spent too much money on marijuana” loaded >.3 on role interference/dependence in the EFA, low loading (<.3) here prompted the removal of this item in the estimation of factor scores.

Supplemental Table 6. Sleep and circadian characteristics predicting alcohol use disorder criteria.

Odds Ratios (95% Confidence Intervals)

AUD Criterion	Eveningness	Midsleep	Sleep Onset Latency	Total Sleep Time ^a	Wake After Sleep Onset
Larger/longer	1.05 (0.98, 1.13)	1.53 (0.93, 2.63)	1.46 (0.13, 12.94)	0.94 (0.58, 1.59)	0.50 (0.02, 5.02)
Cut down	1.05 (0.91, 1.22)	1.25 (0.47, 3.70)	2.51 (0.03, 125.31)	2.26 (0.80, 8.33)	0.00 (0.00, 0.90)
Time spent	1.10 (0.99, 1.22)	1.15 (0.61, 2.25)	1.30 (0.03, 29.06)	1.02 (0.53, 2.06)	5.21 (0.33, 409.26)
Failure to fulfill	0.97 (0.83, 1.14)	0.88 (0.30, 2.56)	0.14 (0.00, 18.41)	1.61 (0.49, 6.85)	0.00 (0.00, 0.66)
Social/ interpersonal	1.01 (0.85, 1.22)	0.76 (0.20, 2.70)	861.24 (7.71, 755644500.00)[†]	2.07 (0.54, 12.38)	1.35 (0.00, 34.03)
Physical/ psychological	1.08 (0.96, 1.22)	1.25 (0.61, 2.68)	4.68 (0.17, 95.78)	1.27 (0.61, 2.85)	15.23 (0.72, 1640.93)
Tolerance	1.05 (0.99, 1.12)	1.34 (0.90, 2.03)	1.94 (0.31, 10.85)	1.00 (0.68, 1.49)	3.63 (0.46, 36.30)
Withdrawal	-	-	-	-	-
Craving	1.14 (0.94, 1.51)	2.68 (0.77, 15.77)	0.60 (0.00, 46.09)	0.72 (0.25, 1.99)	0.00 (0.00, 18.80)
Hazardous use	1.16 (1.03, 1.32)[†]	3.37 (1.46, 9.30)	1.25 (0.06, 17.04)	2.83 (1.28, 7.46)[†]	0.00 (0.00, 0.20)
Give up	-	-	-	-	-

Note. Models control for data set, alcohol consumption, age, sex, race, and income ($N = 159$). Models with "-" would not converge due to low base rate. ^aTotal sleep time is displayed as the inverse odds ratio such that one unit decrease in total sleep time is associated with an increased chance of endorsing a given symptom (if $OR > 1$). Bold = significant at $p < .05$, [†] = no longer significant after Bonferroni correction ($p < .05/5$ sleep outcomes = .01). This data is reflected in Figure 1. AUD symptoms include: (1) alcohol-related withdrawal (withdrawal); (2) alcohol tolerance (tolerance); (3) a great deal of time spent obtaining, using, or recovering from alcohol (time spent); (4) important activities given up or reduced because of alcohol (give up); (5) craving or a strong desire to use alcohol (craving); (6) persistent desire or unsuccessful attempts to cut down or control alcohol use (quit/cut down); (7) drinking more or longer than intended (larger/longer); (8) continued alcohol use despite social or interpersonal problems (social problems); (9) recurrent use in hazardous situations (hazardous use); (10) continued alcohol use despite physical or psychological problem that is caused or made worse by alcohol (physical/psychological); (11) failure to fulfill role obligations due to recurrent alcohol use (failure to fulfill).

Supplemental Table 7. *Sleep and circadian characteristics predicting alcohol-related problem domains.*

Factor	Standardized Regression Estimates (Unstandardized Standard Errors)				
	Eveningness	Midsleep	Sleep Onset Latency	Total Sleep Time	Wake After Sleep Onset
Hazardous use/ Impairment	0.09 (0.00)	0.01 (0.01)	-0.11 (0.04)	-0.03 (0.01)	-0.06 (0.05)
Role interference	0.21 (0.00)	0.13 (0.02)	-0.04 (0.08)	0.08 (0.02)	-0.07 (0.10)

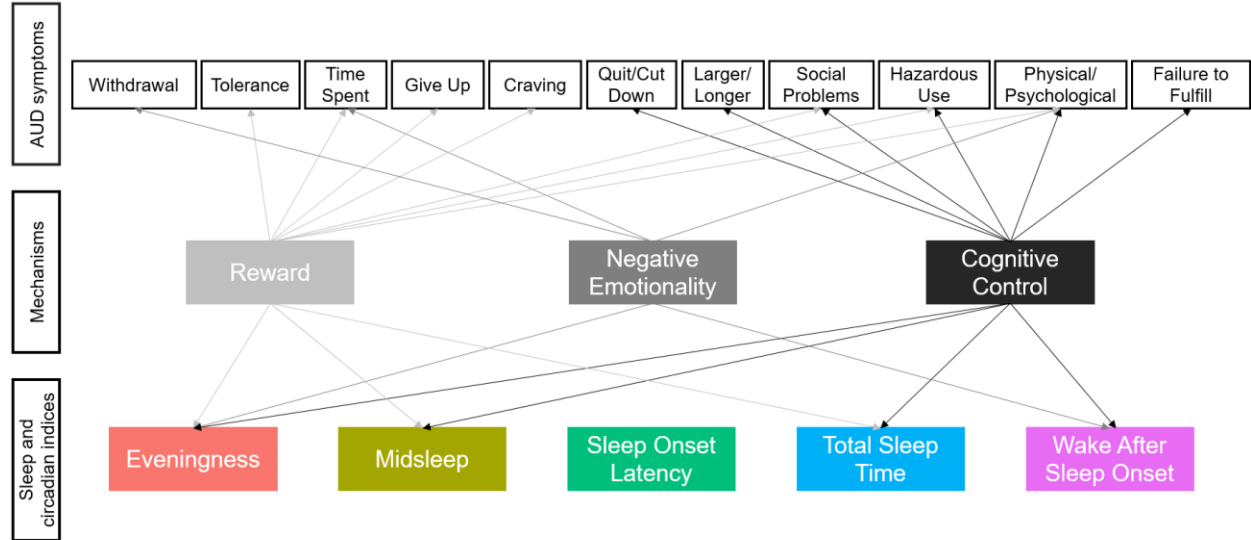
Note. Models control for data set, alcohol consumption, age, sex, race, and income ($N = 159$). Bold = significant at $p < .05$ and after Bonferroni correction ($p < .05/5$ sleep outcomes = .01). This data is reflected in Figure 2.

Supplemental Table 8. *Sleep and circadian characteristics predicting cannabis-related problem domains.*

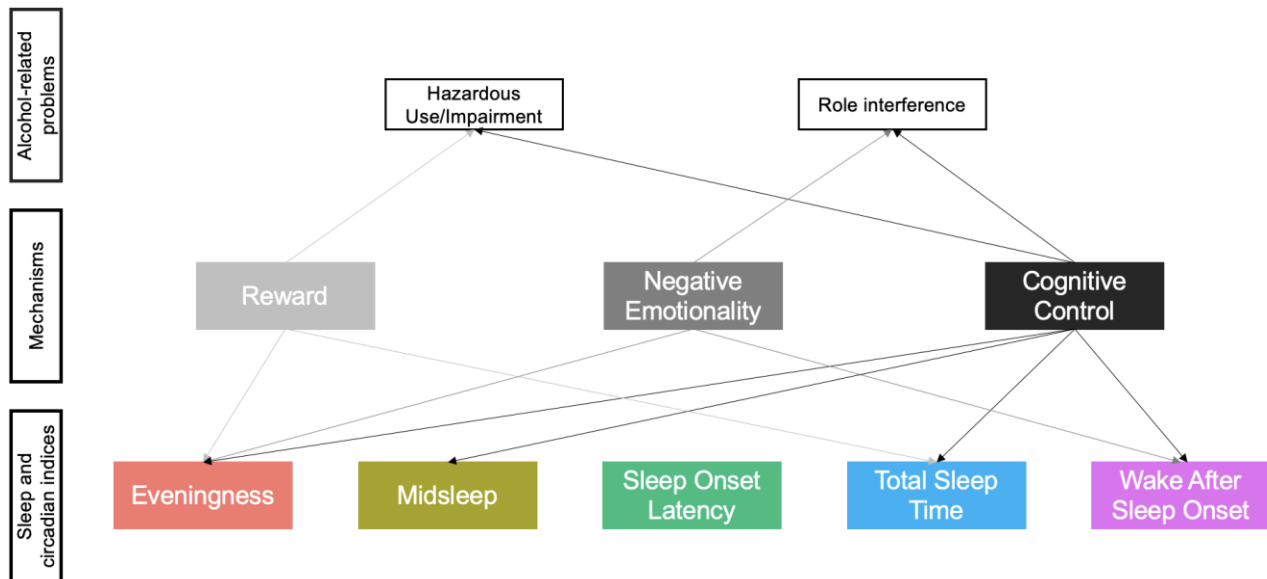
Factor	Standardized Regression Estimates (Unstandardized Standard Errors)				
	Eveningness	Midsleep	Sleep Onset Latency	Total Sleep Time	Wake After Sleep Onset
Role interference/ Dependence	-0.09 (0.00)	-0.02 (0.02)	-0.05 (0.09)	0.07 (0.02)	-0.14 (0.15)
Physical/Psychological	0.00 (0.00)	0.01 (0.01)	0.00 (0.04)	0.04 (0.01)	0.01 (0.07)

Note. Models control for data set, cannabis consumption, age, sex, race, and income ($N = 159$). This data is reflected in Figure 3.

1A. Symptom associations.



1B. Problem-domain associations.



Supplemental Figure 1. (1A) Hypothesized bidirectional associations between alcohol use disorder (AUD) symptoms and sleep/circadian indices based on potentially shared or overlapping mechanisms. AUD symptoms include: (1) alcohol-related withdrawal (withdrawal); (2) alcohol tolerance (tolerance); (3) a great deal of time spent obtaining, using, or recovering from alcohol (time spent); (4) important activities given up or reduced because of alcohol (give up); (5) craving or a strong desire to use alcohol (craving); (6) persistent desire or unsuccessful attempts to cut down or control alcohol use (quit/cut down); (7) drinking more or longer than intended (larger/longer); (8) continued alcohol use despite social or interpersonal problems (social problems); (9) recurrent use in hazardous situations (hazardous use); (10) continued alcohol use despite physical or psychological problem that is caused or made worse by alcohol (physical/psychological); (11) failure to fulfill role obligations due to recurrent alcohol use (failure to fulfill). (1B) Hypothesized bidirectional associations between alcohol-related problems and sleep/circadian indices based on potentially shared or overlapping mechanisms.