Table S1

*Individual-Level and Co-Twin Control Analyses of Problematic Alcohol Use and Hippocampal Volume Including Potentially Confounding Variables*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Co-Twin Control Models | | | |
|  |  | Individual-Level Models | | Between-Pair Effect | | Within-Pair Effect | |
|  | Region | Beta (*SE*) | *p* value | Beta (*SE*) | *p* value | Beta (*SE*) | *p* value |
| Proximal alcohol use |  |  |  |  |  |  |  |
| *Recent alcohol use* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -28.80 (8.26) | < .001 | -3.26 (19.10) | .865 | -28.14 (9.18) | .004 |
| Recent alcohol use |  | -12.00 (1.24) | .345 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -25.33 (9.07) | .007 | -7.03 (19.35) | .717 | -23.48 (10.43) | .029 |
| Recent alcohol use |  | -11.24 (13.35) | .412 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Nicotine frequency* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -30.83 (9.22) | .002 | -6.67 (20.16) | .741 | -29.27 (10.31) | .007 |
| Nicotine frequency |  | -4.03 (4.78) | .416 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -25.98 (9.37) | .009 | -11.03 (19.72 | .577 | -23.09 (10.65) | .037 |
| Nicotine frequency |  | -3.92 (4.73) | .422 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Cannabis frequency* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -29.61 (8.04) | < .001 | 3.29 (20.36) | .872 | -30.22 (8.91) | < .001 |
| Cannabis frequency |  | -9.25 (8.24) | .274 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -30.29 (8.91) | < .001 | -10.31 (20.36) | .614 | -27.71 (10.28) | .010 |
| Cannabis frequency |  | 6.51 (8.74) | .467 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Opioid frequency* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -31.26 (7.89) | < .001 | -5.20 (19.24) | .787 | -30.15 (8.90) | < .001 |
| Opioid frequency |  | 2.88 (16.55) | .864 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -28.43 (8.53) | .002 | -10.39 (19.36) | .593 | -25.72 (9.93) | .013 |
| Opioid frequency |  | 23.74 (18.06) | .199 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Stimulant frequency* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -30.17 (7.78) | < .001 | 2.72 (19.83) | .891 | -30.69 (8.70) | < .001 |
| Stimulant frequency |  | -20.34 (12.22) | .105 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -27.02 (8.47) | .002 | -3.27 (19.94) | .870 | -26.23 (9.76) | .010 |
| Stimulant frequency |  | -19.40 (1.23) | .125 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *CD symptoms* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -29.75 (7.97) | < .001 | -1.87 (19.55) | .924 | -29.39 (8.84) | .002 |
| CD symptoms |  | -14.49 (16.38) | .389 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -26.44 (8.80) | .004 | -6.53 (19.75) | .742 | -24.79 (1.01) | .018 |
| CD symptoms |  | -10.63 (17.15) | .545 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *ASPD symptoms* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -31.86 (8.34) | < .001 | -5.05 (19.19) | .793 | -30.78 (9.30) | .002 |
| ASPD symptoms |  | 6.17 (24.63) | .806 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -29.28 (9.16) | .002 | -8.77 (19.31) | .651 | -26.86 (10.60) | .015 |
| ASPD symptoms |  | 14.45 (2.72) | .602 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Dysphoria* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -30.03 (7.83) | < .001 | -6.51 (19.13) | .734 | -28.64 (8.84) | .002 |
| IDAS Dysphoria |  | -3.60 (2.79) | .208 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -26.30 (8.53) | .003 | -10.41 (19.38) | .592 | -23.55 (9.95) | .022 |
| IDAS Dysphoria |  | -4.18 (3.03) | .179 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Suicidality* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -31.19 (7.81) | < .001 | -5.39 (19.19) | .779 | -30.05 (8.80) | < .001 |
| IDAS Suicidality |  | -6.93 (7.52) | .365 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -27.63 (8.64) | .002 | -8.64 (19.38) | .657 | -25.26 (10.15) | .016 |
| IDAS Suicidality |  | -57.05 (8.42) | .947 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Panic* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -31.49 (7.94) | < .001 | -4.52 (19.29) | .815 | -30.50 (9.00) | < .001 |
| IDAS Panic |  | 1.57 (5.27) | .770 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -27.36 (8.69) | .003 | -9.08 (19.48) | .642 | -24.84 (10.23) | .019 |
| IDAS Panic |  | -1.28 (5.69) | .826 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Social Anxiety* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -30.88 (7.84) | < .001 | -5.26 (19.17) | .784 | -29.76 (8.84) | .002 |
| IDAS Social Anxiety |  | -4.32 (5.19) | .416 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -27.21 (8.55) | .002 | -8.99 (19.37) | .644 | -24.82 (9.99) | .017 |
| IDAS Social Anxiety |  | -5.73 (5.58) | .317 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Traumatic Intrusions* | |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -30.44 (7.90) | < .001 | -5.72 (19.22) | .767 | -29.21 (8.93) | .002 |
| IDAS Traumatic Intrusions | | -5.21 (7.48) | .494 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -27.92 (8.70) | .002 | -8.32 (19.39) | .669 | -25.59 (10.25) | .016 |
| IDAS Traumatic Intrusions | | 2.22 (8.27) | .792 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Traumatic Avoidance* | |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -29.85 (8.07) | < .001 | -7.08 (19.41) | .716 | -28.23 (9.20) | .004 |
| IDAS Traumatic Avoidance | | -4.80 (7.09) | .509 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -26.51 (8.80) | .004 | -10.61 (19.67) | .591 | -23.49 (10.41) | .029 |
| IDAS Traumatic Avoidance | | -4.24 (7.61) | .586 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Stress Reaction* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -30.56 (7.80) | < .001 | -4.87 (19.13) | .800 | -29.53 (8.78) | .002 |
| MPQ Stress Reaction |  | -3.32 (2.71) | .232 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -26.41 (8.37) | .003 | -8.41 (19.18) | .662 | -24.26 (9.71) | .046 |
| MPQ Stress Reaction |  | -5.97 (2.88) | .045 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Alienation* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -30.25 (7.86) | < .001 | -6.74 (19.13) | .726 | -28.78 (8.90) | .002 |
| MPQ Alienation |  | -3.93 (3.46) | .267 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -26.43 (8.55) | .003 | -11.12 (19.25) | .565 | -23.39 (10.06) | .025 |
| MPQ Alienation |  | -5.58 (3.77) | .149 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Aggression* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -31.20 (7.79) | < .001 | -4.23 (19.28) | .827 | -30.32 (8.76) | < .001 |
| MPQ Aggression |  | 4.27 (5.00) | .404 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -27.57 (8.56) | .002 | -9.70 (19.29) | .616 | -24.93 (10.05) | .017 |
| MPQ Aggression |  | -6.13 (5.44) | .272 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Control* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -30.87 (8.00) | < .001 | -4.75 (19.23) | .805 | -29.87 (8.97) | .002 |
| MPQ Control |  | 7.23 (3.43) | .835 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -27.83 (8.79) | .003 | -8.80 (19.41) | .651 | -25.47 (10.23) | .017 |
| MPQ Control |  | -48.67 (3.81) | .900 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Harm Avoidance* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -31.13 (7.87) | < .001 | -4.86 (19.17) | .800 | -30.08 (8.90) | .002 |
| MPQ Harm Avoidance | | -1.15 (2.83) | .689 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -27.50 (8.59) | .002 | -8.28 (19.27) | .668 | -25.22 (10.10) | .016 |
| MPQ Harm Avoidance | | -3.09 (3.07) | .325 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Well Being* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -32.15 (7.67) | < .001 | -2.32 (19.13) | .904 | -31.68 (8.61) | < .001 |
| MPQ Well Being |  | 5.94 (3.16) | .068 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -28.41 (8.54) | .002 | -6.17 (19.21) | .749 | -26.70 (10.07) | .011 |
| MPQ Well Being |  | 5.48 (3.55) | .132 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Trauma exposure* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -30.33 (7.86) | < .001 | -6.22 (19.31) | .748 | -29.01 (8.86) | .002 |
| Trauma exposure |  | -7.14 (8.70) | .423 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -28.01 (8.69) | .002 | -8.03 (19.41) | .680 | -25.76 (10.26) | .016 |
| Trauma exposure |  | 3.73 (9.47) | .700 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Menstrual phase* |  |  |  |  |  |  |  |
| Proximal alcohol use | Left hippocampus | -32.25 (9.00) | < .001 | -1.82 (20.79) | .930 | -31.72 (10.68) | .005 |
| Menstrual phase |  | -0.63 (2.91) | .833 |  |  |  |  |
| Proximal alcohol use | Right hippocampus | -32.23 (10.08) | .003 | 2.55 (21.66) | .907 | -33.14 (12.77) | .014 |
| Menstrual phase |  | -0.03 (3.31) | .991 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Cumulative alcohol use |  |  |  |  |  |  |  |
| *Recent alcohol use* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -14.76 (4.54) | .002 | 15.72 (8.96) | .083 | -21.95 (6.06) | < .001 |
| Recent alcohol use |  | -17.09 (1.20) | .166 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -11.24 (4.81) | .025 | 14.95 (9.50) | .119 | -19.26 (6.98) | .008 |
| Recent alcohol use |  | -16.02 (13.06) | .232 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Nicotine frequency* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -13.95 (5.44) | .014 | 18.22 (10.78) | .094 | -23.39 (7.72) | .004 |
| Nicotine frequency |  | -4.39 (4.99) | .394 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -8.12 (5.44) | .148 | 10.03 (11.03) | .365 | -13.71 (8.22) | .105 |
| Nicotine frequency |  | -5.04 (5.00) | .328 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Cannabis frequency* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -15.03 (4.93) | .004 | 16.76 (9.27) | .074 | -21.90 (6.14) | < .001 |
| Cannabis frequency |  | -5.18 (8.90) | .569 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -14.39 (5.24) | .008 | 12.35 (9.76) | .209 | -20.46 (7.08) | .006 |
| Cannabis frequency |  | 10.10 (9.53) | .302 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Opioid frequency* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.13 (4.51) | < .001 | 15.44 (9.15) | .095 | -23.10 (6.05) | < .001 |
| Opioid frequency |  | -24.86 (16.41) | .881 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.69 (4.74) | .010 | 12.94 (9.62) | .182 | -19.45 (6.89) | .006 |
| Opioid frequency |  | 19.80 (18.08) | .293 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Stimulant frequency* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -15.08 (4.61) | .002 | 20.00 (9.42) | .036 | -23.32 (5.89) | < .001 |
| Stimulant frequency |  | -15.40 (12.95) | .245 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -11.28 (4.88) | .026 | 17.15 (9.86) | .085 | -19.59 (6.76) | .006 |
| Stimulant frequency |  | -16.13 (13.13) | .230 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *CD symptoms* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -15.40 (4.75) | .002 | 16.56 (9.22) | .075 | -22.24 (6.01) | < .001 |
| CD symptoms |  | -9.04 (17.27) | .609 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -11.95 (5.07) | .023 | 15.45 (9.73) | .116 | -19.57 (6.94) | .007 |
| CD symptoms |  | -6.62 (18.29) | .724 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *ASPD symptoms* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -15.81 (4.59) | < .001 | 15.46 (9.07) | .092 | -22.57 (6.01) | < .001 |
| ASPD symptoms |  | -9.49 (23.54) | .691 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.53 (4.88) | .014 | 14.32 (9.61) | .139 | -19.97 (6.94) | .006 |
| ASPD symptoms |  | -57.04 (26.30) | .983 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Dysphoria* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.42 (4.43) | < .001 | 14.73 (8.93) | .102 | -22.85 (5.85) | < .001 |
| IDAS Dysphoria |  | -4.94 (2.74) | .079 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -13.06 (4.69) | .008 | 13.96 (9.40) | .141 | -20.11 (6.64) | .004 |
| IDAS Dysphoria |  | -5.50 (3.00) | .075 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Suicidality* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.37 (4.49) | < .001 | 14.63 (9.03) | .109 | -22.85 (5.96) | < .001 |
| IDAS Suicidality |  | -7.84 (7.47) | .302 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.60 (4.77) | .011 | 14.10 (9.57) | .144 | -20.07 (6.93) | .006 |
| IDAS Suicidality |  | -1.57 (8.41) | .854 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Panic* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.13 (4.51) | < .001 | 14.94 (9.07) | .103 | -22.82 (6.01) | < .001 |
| IDAS Panic |  | -10.36 (5.23) | .846 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.62 (4.76) | .011 | 14.12 (9.54) | .142 | -20.00 (6.86) | .005 |
| IDAS Panic |  | -3.62 (5.68) | .533 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Social Anxiety* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.26 (4.48) | < .001 | 14.83 (9.02) | .103 | -22.86 (5.96) | < .001 |
| IDAS Social Anxiety |  | -5.47 (5.19) | .303 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.86 (4.73) | .009 | 14.02 (9.48) | .142 | -20.11 (6.78) | .005 |
| IDAS Social Anxiety |  | -6.98 (5.61) | .226 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Traumatic Intrusions* | |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -15.88 (4.50) | < .001 | 14.29 (9.07) | .118 | -22.29 (6.01) | < .001 |
| IDAS Traumatic Intrusions | | -7.33 (7.38) | .330 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.55 (4.77) | .012 | 14.23 (9.60) | .142 | -20.14 (6.67) | .006 |
| IDAS Traumatic Intrusions | | -24.19 (8.24) | .977 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *IDAS Traumatic Avoidance* | |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.09 (4.45) | < .001 | 13.39 (9.06) | .143 | -21.99 (5.93) | < .001 |
| IDAS Traumatic Avoidance | | -10.73 (6.82) | .126 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.78 (4.73) | .009 | 12.74 (9.57) | .186 | -19.30 (6.80) | .007 |
| IDAS Traumatic Avoidance | | -9.91 (7.42) | .194 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Stress Reaction* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.00 (4.47) | < .001 | 15.20 (8.99) | .094 | -22.69 (5.92) | < .001 |
| MPQ Stress Reaction |  | -3.58 (2.71) | .198 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.47 (4.66) | .010 | 14.64 (9.32) | .119 | -19.84 (6.58) | .004 |
| MPQ Stress Reaction |  | -6.30 (2.89) | .035 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Alienation* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -15.78 (4.48) | < .001 | 13.95 (9.04) | .126 | -22.09 (6.01) | < .001 |
| MPQ Alienation |  | -4.57 (3.44) | .193 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.27 (4.70) | .012 | 12.82 (9.48) | .180 | -19.04 (6.84) | .008 |
| MPQ Alienation |  | -6.22 (3.76) | .107 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Aggression* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.36 (4.49) | < .001 | 15.75 (9.06) | .085 | -23.23 (5.90) | < .001 |
| MPQ Aggression |  | 4.44 (4.99) | .384 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.64 (4.73) | .010 | 13.39 (9.53) | .163 | -19.71 (6.88) | .006 |
| MPQ Aggression |  | -6.36 (5.48) | .257 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Control* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -15.97 (4.61) | < .001 | 14.93 (9.07) | .103 | -22.71 (6.10) | < .001 |
| MPQ Control |  | 0.48 (3.43) | .890 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.73 (4.88) | .012 | 14.16 (9.56) | .142 | -20.27 (7.01) | .006 |
| MPQ Control |  | -0.61 (3.83) | .876 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Harm Avoidance* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.22 (4.51) | < .001 | 15.82 (9.11) | .086 | -23.37 (6.05) | < .001 |
| MPQ Harm Avoidance | | -1.55 (2.83) | .591 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.71 (4.74) | .010 | 15.82 (9.56) | .101 | -21.07 (6.89) | .004 |
| MPQ Harm Avoidance | | -3.33 (3.08) | .292 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *MPQ Well Being* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.26 (4.45) | < .001 | 15.39 (8.96) | .089 | -22.98 (5.87) | < .001 |
| MPQ Well Being |  | 4.89 (3.17) | .132 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.44 (4.72) | .011 | 14.54 (9.48) | .128 | -20.19 (6.88) | .005 |
| MPQ Well Being |  | 4.52 (3.56) | .215 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Trauma exposure* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -16.07 (4.48) | < .001 | 14.61 (9.04) | .109 | -22.40 (5.90) | < .001 |
| Trauma exposure |  | -10.18 (8.61) | .248 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.58 (4.77) | .011 | 14.21 (9.57) | .141 | -20.15 (6.95) | .006 |
| Trauma exposure |  | 0.99 (9.52) | .919 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *Menstrual phase* |  |  |  |  |  |  |  |
| Cumulative alcohol use | Left hippocampus | -15.71 (4.77) | .002 | 16.63 (9.59) | .086 | -23.58 (6.58) | < .001 |
| Menstrual phase |  | -43.08 (2.85) | .883 |  |  |  |  |
| Cumulative alcohol use | Right hippocampus | -12.78 (5.21) | .019 | 17.32 (10.64) | .107 | -23.00 (8.15) | .008 |
| Menstrual phase |  | 0.07 (3.34) | .983 |  |  |  |  |

*Notes*. Results of individual-level linear mixed models and co-twin control analyses that include potentially confounding variables (in separate models). Individual-level analyses examined associations between proximal (age-24 alcohol index) and cumulative (age 11 to age 24) alcohol use and hippocampal volume; models included random intercepts at the twin-pair level to account for within-pair correlations. Individual-level analyses were followed up using co-twin control analyses that decomposed effects into between-pair (pre-existing, shared familial liability) and within-pair (alcohol exposure) effects.All models included participant age, zygosity, and total brain volume as covariates. *N* = 100 twins in individual-level models, *n* = 98 twins (from 49 intact twin pairs) in co-twin control models.