**Supplementary File**

**Behavioral stability of alcohol consumption and sociodemographic correlates of change**

**among a nationally representative cohort of US adults**

Klajdi Puka, Charlotte Buckley, Nina Mulia, Robin C. Purshouse, Aurélie M. Lasserre,

William Kerr, Jürgen Rehm, Charlotte Probst

Table S1. Participant characteristics of the raw data (not accounting for the sampling weights).

|  |  |  |
| --- | --- | --- |
|  | Baselinen (%) | Follow-upn (%) |
| Sample size | 34,354 | 34,354 |
| Sex, n female | 19,962 (58%) | 19,962 (58%) |
| Age, mean years (SD)  | 46.0 (17.4) | 49.1 (17.3) |
|  18 – 20 years | 1,663 (5%) | 24 (0%) |
|  21 - 25 years | 2,745 (8%) | 2,672 (8%) |
|  26 – 29 years | 2,213 (6%) | 2,175 (6%) |
|  30 – 39 years  | 7,232 (21%) | 6,561 (19%) |
|  40 – 49 years  | 7,094 (21%) | 7,473 (22%) |
|  50 – 64 years | 7,431 (22%) | 8,333 (24%) |
|  65+ years  | 5,976 (17%) | 7,116 (21%) |
| Race and ethnicity |  |  |
|  White, non-Hispanic | 20,417 (59%) | 19,978 (58%) |
|  Black, non-Hispanic | 6,522 (19%) | 6,531 (19%) |
|  Hispanic/Latinx | 6,307 (18%) | 6,311 (18%) |
|  Other, non-Hispanic | 1,108 (3%) | 1,534 (4%) |
| Educational attainment  |  |  |
|  Low | 15,553 (45%) | 14,823 (43%) |
|  Medium | 10,389 (30%) | 10,698 (31%) |
|  High | 8,412 (24%) | 8,833 (26%) |
| Quantity of alcohol consumption |  |  |
|  Non-drinker | 12,609 (37%) | 12,679 (37%) |
|  Category I | 18,618 (54%) | 18,486 (54%) |
|  Category II | 1,388 (4%) | 1,486 (4%) |
|  Category III | 1,739 (5%) | 1,703 (5%) |
| Pattern of alcohol consumption |  |  |
|  Non-drinker | 12,609 (37%) | 12,679 (37%) |
|  Drinker, no HED | 14,291 (42%) | 13,130 (38%) |
|  Occasional HED | 3,111 (9%) | 4,063 (12%) |
|  Monthly HED | 1,713 (5%) | 1,801 (5%) |
|  Weekly HED | 2,630 (8%) | 2,681 (8%) |

HED: Heavy episodic drinking.

Table S2. Raw transition frequencies (not accounting for sampling weights).

|  |  |
| --- | --- |
|  | **Quantity of Alcohol Consumption** |
|  |  | **Follow-up** |
|  |  | Non-drinker | Category I | Category II | Category III |
| **Baseline** | Non-drinker | 9,632 | 2,770 | 101 | 106 |
| Category I | 2,875 | 14,258 | 787 | 698 |
| Category II | 62 | 734 | 334 | 258 |
| Category III | 110 | 724 | 264 | 641 |
|  |  |  |  |  |  |  |
|  | **Pattern of Alcohol Consumption** |
|  |  | **Follow-up** |
|  |  | Non-drinker | Drinker,no HED | Occasional HED | Monthly HED | Weekly HED |
| **Baseline** | Non-drinker | 9,632 | 2,303 | 324 | 136 | 214 |
| Drinker, no HED | 2,492 | 9,152 | 1,638 | 479 | 530 |
| Occasional HED | 258 | 990 | 1,168 | 354 | 341 |
| Monthly HED | 117 | 342 | 493 | 376 | 385 |
| Weekly HED | 180 | 343 | 440 | 456 | 1,211 |

 HED: Heavy Episodic Drinking; NESARC: National Epidemiologic Survey of Alcohol and Related Conditions

Table S3. Transition frequencies of the expanded data (accounting for sampling weights).

|  |  |
| --- | --- |
|  | **Quantity of Alcohol Consumption** |
|  |  | **Follow-up** |
|  |  | Non-drinker | Category I | Category II | Category III |
| **Baseline** | Non-drinker | 535,175 | 157,870 | 5,562 | 6,131 |
| Category I | 163,450 | 886,477 | 49,509 | 45,196 |
| Category II | 3,792 | 44,200 | 20,296 | 16,591 |
| Category III | 6,317 | 45,392 | 16,436 | 40,780 |
|  |  |  |  |  |  |  |
|  | **Pattern of Alcohol Consumption** |
|  |  | **Follow-up** |
|  |  | Non-drinker | Drinker,no HED | Occasional HED | Monthly HED | Weekly HED |
| **Baseline** | Non-drinker | 535,175 | 128,594 | 20,551 | 8,232 | 12,186 |
| Drinker, no HED | 139,516 | 556,062 | 102,599 | 28,230 | 32,484 |
| Occasional HED | 16,427 | 61,725 | 78,032 | 23,107 | 22,150 |
| Monthly HED | 7,002 | 19,446 | 31,804 | 23,466 | 25,118 |
| Weekly HED | 10,614 | 19,468 | 28,895 | 30,397 | 81,894 |

 HED: Heavy Episodic Drinking

Table S4. Annual transition probabilities (expressed as a percentage) and 95% confidence interval between drinking states, not adjusting for any covariates.

|  |  |
| --- | --- |
|  | **Quantity of Alcohol Consumption** |
|  |  | **One-year Follow-up** |
|  |  | Non-drinker | Category I | Category II | Category III |
| **Initial State** | Non-drinker | 90.8 (90.4, 91.1) | 9 (8.7, 9.3) | 0.2 (0.1, 0.2) | 0.1 (0, 0.1) |
| Category I | 5.7 (5.5, 5.9) | 90.2 (90, 90.5) | 2.6 (2.4, 2.9) | 1.4 (1.3, 1.6) |
| Category II | 1.2 (1.1, 1.3) | 32.2 (29.7, 34.6) | 30.4 (28.7, 32.1) | 36.2 (33.5, 39) |
| Category III | 0.4 (0.3, 0.4) | 14.4 (13, 15.8) | 30.5 (28.1, 32.8) | 54.8 (51.3, 58.3) |
|  |  |  |  |  |  |  |
|  | **Pattern of Alcohol Consumption** |
|  |  | **One-year Follow-up** |
|  |  | Non-drinker | Drinker,no HED | Occasional HED | Monthly HED | Weekly HED |
| **Initial State** | Non-drinker | 89.7 (89.3, 90.1) | 9.7 (9.3, 10.1) | 0.5 (0.4, 0.5) | 0.1 (0.1, 0.1) | 0.0 (0.0, 0.0) |
| Drinker, no HED | 8.3 (8.0, 8.6) | 82.4 (81.8, 83.0) | 7.2 (6.7, 7.7) | 1.6 (1.4, 1.9) | 0.5 (0.4, 0.5) |
| Occasional HED | 1.5 (1.4, 1.6) | 26.7 (25.0, 28.5) | 45.8 (44.1, 47.4) | 17.3 (15.5, 19.1) | 8.7 (7.7, 9.8) |
| Monthly HED | 0.6 (0.5, 0.6) | 13.5 (11.8, 15.3) | 38.8 (35.1, 42.4) | 22.9 (20.7, 25.0) | 24.3 (20.1, 28.5) |
| Weekly HED | 0.1 (0.1, 0.1) | 2.8 (2.4, 3.1) | 14.1 (12.5, 15.7) | 17.5 (14.5, 20.5) | 65.5 (61.8, 69.3) |

HED: Heavy Episodic Drinking

Table S5. Participant characteristics of NESARC I and III.

|  |  |  |
| --- | --- | --- |
|  | NESARC I | NESARC III |
| Sex, % female | 52% | 52% |
| Age, mean years (SD)  | 45.1 (17.3) | 46.6 (17.8) |
|  18 – 20 years | 6% | 5% |
|  21 – 25 years | 9% | 10% |
|  26 – 29 years | 7% | 7% |
|  30 – 39 years | 20% | 17% |
|  40 – 49 years | 21% | 18% |
|  50 – 64 years  | 21% | 26% |
|  65+ years | 16% | 18% |
| Race and ethnicity |  |  |
|  White, non-Hispanic | 73% | 66% |
|  Black, non-Hispanic | 11% | 12% |
|  Hispanic/Latinx | 12% | 15% |
|  Other, non-Hispanic | 5% | 7% |
| Educational attainment |  |  |
|  Low | 44% | 39% |
|  Medium | 31% | 33% |
|  High | 26% | 28% |
| Quantity of alcohol consumption |  |  |
|  Non-drinker | 34% | 28% |
|  Category I | 56% | 59% |
|  Category II | 4% | 5% |
|  Category III | 5% | 7% |
| Pattern of alcohol consumption |  |  |
|  Non-drinker | 34% | 28% |
|  Drinker, No HED | 42% | 39% |
|  Occasional HED | 10% | 14% |
|  Monthly HED | 5% | 7% |
|  Weekly HED | 8% | 11% |

Observations were replicated in accordance with their sample weight.

HED: Heavy episodic drinking.

Table S6. Results of external validation for the quantity of alcohol consumption for each stratum.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Strata | Category | Observed % | Predicted % | % Difference |
| Overall | Non-drinker  | 28.3 | 29.3 | 1.0 |
|  | Category I  | 58.9 | 59.2 | 0.3 |
|  | Category II  | 5.4 | 5.3 | -0.1 |
|  | Category III  | 7.4 | 6.2 | -1.2 |
| Men | Non-drinker  | 24.2 | 25.6 | 1.4 |
|  | Category I  | 61.5 | 61.5 | 0.0 |
|  | Category II  | 4.8 | 4.4 | -0.4 |
|  | Category III  | 9.4 | 8.5 | -0.9 |
| Women | Non-drinker  | 32.0 | 32.8 | 0.8 |
|  | Category I  | 56.4 | 57 | 0.6 |
|  | Category II  | 6.0 | 6.1 | 0.1 |
|  | Category III  | 5.5 | 4.1 | -1.4 |
| Low education | Non-drinker  | 37.7 | 38.0 | 0.3 |
|  | Category I  | 51.1 | 51.7 | 0.6 |
|  | Category II  | 3.9 | 4.3 | 0.4 |
|  | Category III  | 7.3 | 6.0 | -1.3 |
| Medium education | Non-drinker  | 24.9 | 26.1 | 1.2 |
| Category I  | 61.4 | 62 | 0.6 |
| Category II  | 5.7 | 5.5 | -0.2 |
| Category III  | 8.0 | 6.4 | -1.6 |
| High education  | Non-drinker  | 19.4 | 18.6 | -0.8 |
|  | Category I  | 66.5 | 68.5 | 2.0 |
|  | Category II  | 7.2 | 6.6 | -0.6 |
|  | Category III  | 6.9 | 6.3 | -0.6 |
| White, non-Hispanic | Non-drinker  | 25.4 | 24.9 | -0.5 |
| Category I  | 60.7 | 62.7 | 2.0 |
| Category II  | 6.2 | 5.9 | -0.3 |
| Category III  | 7.8 | 6.5 | -1.3 |
| Black, non-Hispanic | Non-drinker  | 35.4 | 41 | 5.6 |
| Category I  | 50.8 | 48.1 | -2.7 |
| Category II  | 4.5 | 4.0 | -0.5 |
| Category III  | 9.4 | 6.9 | -2.5 |
| Hispanic/Latinx | Non-drinker  | 31.7 | 39.1 | 7.4 |
|  | Category I  | 58.8 | 53.7 | -5.1 |
|  | Category II  | 4.0 | 3.3 | -0.7 |
|  | Category III  | 5.5 | 4.0 | -1.5 |
| Other, non-Hispanic | Non-drinker  | 36.1 | 46.9 | 10.8 |
| Category I  | 55.8 | 44.1 | -11.7 |
| Category II  | 3.1 | 3.8 | 0.7 |
| Category III  | 5.0 | 5.2 | 0.2 |

The observed proportion is based on NESARC III data, and the predicted proportion is based on the NESARC I population simulated over 11 years using the alcohol transition probabilities.

Table S7. Results of external validation for the pattern of alcohol consumption for each stratum.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Strata | Category | Observed % | Predicted % | % Difference |
| Overall | Non-drinker  | 28.3 | 28.2 | -0.1 |
|  | Drinker, no HED  | 39.1 | 37.3 | -1.8 |
|  | Occasional HED  | 14.3 | 16.5 | 2.2 |
|  | Monthly HED  | 7.4 | 7.3 | -0.1 |
|  | Weekly HED  | 10.8 | 10.7 | -0.1 |
| Men | Non-drinker  | 24.2 | 23.9 | -0.3 |
| Drinker, no HED  | 36.8 | 33.2 | -3.6 |
| Occasional HED  | 15.5 | 18.6 | 3.1 |
| Monthly HED  | 8.8 | 9.1 | 0.3 |
| Weekly HED  | 14.7 | 15.2 | 0.5 |
| Women | Non-drinker  | 32.0 | 32.2 | 0.2 |
| Drinker, no HED  | 41.3 | 40.9 | -0.4 |
| Occasional HED  | 13.2 | 14.5 | 1.3 |
| Monthly HED  | 6.2 | 5.7 | -0.5 |
| Weekly HED  | 7.3 | 6.6 | -0.7 |
| Low education | Non-drinker  | 37.7 | 36.7 | -1.0 |
| Drinker, no HED  | 32.3 | 31.1 | -1.2 |
| Occasional HED  | 10.3 | 12.9 | 2.6 |
| Monthly HED  | 7.1 | 7.0 | -0.1 |
| Weekly HED  | 12.6 | 12.4 | -0.2 |
| Medium education | Non-drinker  | 24.9 | 24.8 | -0.1 |
| Drinker, no HED  | 39.2 | 39.0 | -0.2 |
| Occasional HED  | 15.8 | 17.9 | 2.1 |
| Monthly HED  | 8.3 | 7.2 | -1.1 |
| Weekly HED  | 11.8 | 11.1 | -0.7 |
| High education | Non-drinker  | 19.4 | 18.0 | -1.4 |
| Drinker, no HED  | 48.5 | 45.7 | -2.8 |
| Occasional HED  | 18.2 | 21.0 | 2.8 |
| Monthly HED  | 6.8 | 8.1 | 1.3 |
| Weekly HED  | 7.2 | 7.2 | 0 |
| White, non-Hispanic | Non-drinker  | 25.4 | 23.8 | -1.6 |
| Drinker, no HED  | 40.5 | 38.1 | -2.4 |
| Occasional HED  | 16.0 | 19.0 | 3.0 |
| Monthly HED  | 7.4 | 8.0 | 0.6 |
| Weekly HED  | 10.6 | 11.0 | 0.4 |
| Black, non-Hispanic | Non-drinker  | 35.4 | 39.5 | 4.1 |
| Drinker, no HED  | 39.3 | 37.5 | -1.8 |
| Occasional HED  | 7.3 | 8.0 | 0.7 |
| Monthly HED  | 6.1 | 4.7 | -1.4 |
| Weekly HED  | 11.9 | 10.3 | -1.6 |
| Hispanic/Latinx | Non-drinker  | 31.7 | 37.4 | 5.7 |
| Drinker, no HED  | 32.8 | 32.3 | -0.5 |
| Occasional HED  | 13.7 | 12.3 | -1.4 |
| Monthly HED  | 9.5 | 6.7 | -2.8 |
| Weekly HED  | 12.2 | 11.4 | -0.8 |
| Other, non-Hispanic | Non-drinker  | 36.1 | 46.5 | 10.4 |
| Drinker, no HED  | 38.9 | 35.4 | -3.5 |
| Occasional HED  | 12.0 | 8.2 | -3.8 |
| Monthly HED  | 5.0 | 4.6 | -0.4 |
| Weekly HED  | 8.1 | 5.3 | -2.8 |

The observed proportion is based on NESARC III data, and the predicted proportion is based on the NESARC I population simulated over 11 years using the alcohol transition probabilities.

**Figure Captions**

Figure S1. Probability of transitioning to each drinking state (or staying in the same state) over time, stratified by the initial drinking state and age.

Figure S2. Probability of transitioning to each drinking state (or staying in the same state) over time, stratified by the initial drinking state and educational attainment.

Figure S3. Probability of transitioning to each drinking state (or staying in the same state) over time, stratified by the initial drinking state and race and ethnicity.

Figure S4. Probability of transitioning to each drinking state (or staying in the same state) over time, stratified by the initial drinking state and sex.

 Figure S5. Probability of transitioning to each drinking state (or staying in the same state) over time, stratified by the initial drinking state and age.

Figure S6. Probability of transitioning to each drinking state (or staying in the same state) over time, stratified by the initial drinking state and educational attainment.

Figure S7. Probability of transitioning to each drinking state (or staying in the same state) over time, stratified by the initial drinking state and race and ethnicity.

Figure S8. Probability of transitioning to each drinking state (or staying in the same state) over time, stratified by the initial drinking state and sex.

**Statistical Code**

The statistical code for this manuscript is publicly available at <https://github.com/kpuka/SIMAH_clean/tree/main/Puka_2022_Alcohol_transitions>