

Supplementary Material

Article Title: Nonmedical Use and Substance Use Disorder Symptoms Among US Adults Co-Prescribed Opioids and Benzodiazepines

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LIST OF SUPPLEMENTARY MATERIAL FOR THE ARTICLE

1. [Table 1](#) Respondent-Level Prevalence of Medical Use of Prescription Opioids and/or Benzodiazepines in Adulthood
2. [Table 2](#) Associations Between Past-Year Medical Use of Prescription Opioids and/or Benzodiazepines and Past-Year Nonmedical Use (NMU) and Past-5-Year Substance Use Disorder (SUD) Symptoms in Adulthood
3. [Table 3](#) Associations Between Past-5-Year Medical Use of Prescription Opioids and/or Benzodiazepines and Past-5-Year Other Drug Use Disorder (ODUD) Symptoms in Adulthood
4. [Table 4](#) Associations Between Past-Year Medical Use of Prescription Opioids and/or Benzodiazepines and Past-5-Year Other Drug Use Disorder (ODUD) Symptoms in Adulthood

DISCLAIMER

This Supplementary Material has been provided by the authors as an enhancement to the published article. It has been approved by peer review; however, it has undergone neither editing nor formatting by in-house editorial staff. The material is presented in the manner supplied by the author.

Supplementary Table 1. Respondent-Level Prevalence of Medical Use of Prescription Opioids and/or Benzodiazepines in Adulthood

Medical Use	Past-Year		Past-5-Year	
	Unweighted n	Unweighted % (95% CI)	Unweighted n	Unweighted % (95% CI)
Co-use	1658/31038	5.34 (5.10, 5.60)	2633/25423	10.36 (9.99, 10.74)
Opioid use	5846/31038	18.83 (18.40, 19.27)	8296/25423	32.63 (32.06, 33.21)
Benzodiazepine use	3710/31038	11.95 (11.60, 12.32)	4410/25423	17.35 (16.89, 17.82)
Any use	7700/31038	24.81 (24.33, 25.29)	9821/25423	38.63 (38.03, 39.23)

Note: Rows are not mutually exclusive; the same respondent may be represented in multiple rows based on their medical use at each survey wave. Past-year estimates incorporate data from ages 35 through 60 (baseline cohorts 1976-2002); past-5-year estimates incorporate data from ages 40 through 60 (baseline cohorts 1976-1997).

Supplementary Table 2. Associations Between Past-Year Medical Use of Prescription Opioids and/or Benzodiazepines and Past-Year Nonmedical Use (NMU) and Past-5-Year Substance Use Disorder (SUD) Symptoms in Adulthood

	Nonmedical Use of Opioids or Benzodiazepines							
			n = 30836 obs. = 58065	n = 27547 obs. = 50040	n = 30836 obs. = 58065	n = 27547 obs. = 50040	n = 30836 obs. = 58065	n = 27547 obs. = 50040
Medical Use	obs. ^a	% (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)
Neither	2301/48254	4.20 (3.99, 4.43)	Ref.	Ref.	0.18 (0.16, 0.20)	0.22 (0.19, 0.24)	0.17 (0.15, 0.19)	0.21 (0.19, 0.25)
Opioids	1062/5208	19.87 (18.54, 21.27)	5.61 (5.08, 6.20)	4.64 (4.16, 5.18)	Ref.	Ref.	0.95 (0.82, 1.09)	1.00 (0.85, 1.17)
Benzodiazepines	573/2729	20.47 (18.72, 22.35)	5.93 (5.24, 6.71)	4.66 (4.03, 5.38)	1.06 (0.92, 1.22)	1.00 (0.86, 1.18)	Ref.	Ref.
Co-use	500/1874	24.90 (22.59, 27.37)	7.68 (6.69, 8.83)	5.36 (4.54, 6.32)	1.37 (1.18, 1.60)	1.16 (0.97, 1.38)	1.30 (1.10, 1.53)	1.15 (0.95, 1.40)
	2+ Any SUD Symptoms							
			n = 30240 obs. = 46171	n = 26904 obs. = 39997	n = 30240 obs. = 46171	n = 26904 obs. = 39997	n = 30240 obs. = 46171	n = 26904 obs. = 39997
Medical Use	obs. ^a	% (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)
Neither	9445/38119	23.37 (22.82, 23.92)	Ref.	Ref.	0.64 (0.59, 0.69)	0.75 (0.68, 0.82)	0.51 (0.46, 0.58)	0.56 (0.49, 0.64)
Opioids	1455/4337	32.53 (30.85, 34.26)	1.57 (1.45, 1.71)	1.34 (1.22, 1.47)	Ref.	Ref.	0.81 (0.71, 0.92)	0.75 (0.64, 0.87)
Benzodiazepines	820/2157	36.83 (34.34, 39.40)	1.94 (1.74, 2.18)	1.79 (1.56, 2.05)	1.24 (1.08, 1.41)	1.34 (1.15, 1.57)	Ref.	Ref.
Co-use	661/1558	40.19 (37.24, 43.20)	2.28 (2.01, 2.59)	1.84 (1.58, 2.14)	1.45 (1.26, 1.68)	1.37 (1.16, 1.63)	1.17 (1.00, 1.38)	1.02 (0.85, 1.24)

All sample sizes (n) and observation counts (obs.) are unweighted. Missing data were handled using listwise deletion. Models for SUD symptoms include data from 2007-2016 due to changes in survey methodology in 2017. Models examining nonmedical use include data from 2007-2019. All prevalence rates (%), unadjusted odds ratios (uOR), adjusted odds ratios (aOR), and confidence intervals (CI) incorporate panel analysis weights from the MTF. For adjusted models, control variables include cohort group, population density, region, sex, race-ethnicity, parental education, grade point average, cigarette use, binge drinking, marijuana use, other illicit drug use, and nonmedical prescription drug use at baseline. Other controls include completion of a bachelor's degree by age 35, and time-varying controls for marital status, employment status, and trouble sleeping in the past 30 days. Unadjusted and adjusted models also control for age (0=35, 1=40, 2=45, 3=50, 4=55, 5=60). The SUD outcome variable represents ≥2 alcohol use disorder, ≥2 cannabis use disorder, or ≥2 other drug use disorder symptoms. All outcomes and the main independent variable are time-varying.

^aObservation counts show the total number of positive responses for the outcome (numerator) over the total number of observations in the given medical use group (denominator).

Supplementary Table 3. Associations Between Past-5-Year Medical Use of Prescription Opioids and/or Benzodiazepines and Past-5-Year Other Drug Use Disorder (ODUD) Symptoms in Adulthood

	2+ ODUD Symptoms							
			n = 21382 obs. = 32179	n = 18750 obs. = 27444	n = 21382 obs. = 32179	n = 18750 obs. = 27444	n = 21382 obs. = 32179	n = 18750 obs. = 27444
Medical Use	obs. ^a	% (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)
Neither	375/23206	1.41 (1.24, 1.61)	Ref.	Ref.	0.29 (0.24, 0.35)	0.34 (0.28, 0.43)	0.45 (0.33, 0.61)	0.64 (0.45, 0.92)
Opioids	295/5302	4.79 (4.17, 5.50)	3.49 (2.88, 4.23)	2.90 (2.33, 3.62)	Ref.	Ref.	1.58 (1.15, 2.16)	1.86 (1.27, 2.72)
Benzodiazepines	66/1570	3.05 (2.32, 4.00)	2.22 (1.63, 3.01)	1.56 (1.09, 2.24)	0.63 (0.46, 0.87)	0.54 (0.37, 0.79)	Ref.	Ref.
Co-use	285/2101	12.17 (10.63, 13.90)	9.77 (7.99, 11.94)	6.85 (5.38, 8.71)	2.80 (2.28, 3.44)	2.36 (1.82, 3.06)	4.41 (3.21, 6.05)	4.39 (2.99, 6.46)

All sample sizes (n) and observation counts (obs.) are unweighted. Missing data were handled using listwise deletion. Models for ODUD symptoms include data from 2007-2016 due to changes in survey methodology in 2017. All prevalence rates (%), unadjusted odds ratios (uOR), adjusted odds ratios (aOR), and confidence intervals (CI) incorporate panel analysis weights from the MTF. For adjusted models, control variables include cohort group, population density, region, sex, race-ethnicity, parental education, grade point average, cigarette use, binge drinking, marijuana use, other illicit drug use, and nonmedical prescription drug use at baseline. Other controls include completion of a bachelor's degree by age 35, and time-varying controls for marital status, employment status, and trouble sleeping in the past 30 days. Unadjusted and adjusted models also control for age (0=40, 1=45, 2=50, 3=55). The ODUD outcome variable represents ≥2 other drug use disorder symptoms. All outcomes and the main independent variable are time-varying.

^aObservation counts show the total number of positive responses for the outcome (numerator) over the total number of observations in the given medical use group (denominator).

Supplementary Table 4. Associations Between Past-Year Medical Use of Prescription Opioids and/or Benzodiazepines and Past-5-Year Other Drug Use Disorder (ODUD) Symptoms in Adulthood

	2+ ODUD Symptoms							
			n = 29213 obs. = 43290	n = 25923 obs. = 37537	n = 29213 obs. = 43290	n = 25923 obs. = 37537	n = 29213 obs. = 43290	n = 25923 obs. = 37537
Medical Use	obs. ^a	% (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)
Neither	872/36175	2.11 (1.94, 2.29)	Ref.	Ref.	0.24 (0.21, 0.29)	0.29 (0.24, 0.36)	0.32 (0.25, 0.40)	0.45 (0.34, 0.59)
Opioids	329/3883	8.19 (7.17, 9.34)	4.12 (3.49, 4.86)	3.40 (2.80, 4.12)	Ref.	Ref.	1.32 (1.02, 1.70)	1.53 (1.13, 2.07)
Benzodiazepines	126/1872	6.21 (5.07, 7.59)	3.12 (2.48, 3.93)	2.23 (1.70, 2.92)	0.76 (0.59, 0.98)	0.65 (0.48, 0.89)	Ref.	Ref.
Co-use	229/1360	14.49 (12.45, 16.80)	8.17 (6.71, 9.94)	4.73 (3.66, 6.10)	1.98 (1.58, 2.49)	1.39 (1.04, 1.85)	2.62 (1.99, 3.44)	2.12 (1.51, 2.98)

All sample sizes (n) and observation counts (obs.) are unweighted. Missing data were handled using listwise deletion. Models for ODUD symptoms include data from 2007-2016 due to changes in survey methodology in 2017. All prevalence rates (%), unadjusted odds ratios (uOR), adjusted odds ratios (aOR), and confidence intervals (CI) incorporate panel analysis weights from the MTF. For adjusted models, control variables include cohort group, population density, region, sex, race-ethnicity, parental education, grade point average, cigarette use, binge drinking, marijuana use, other illicit drug use, and nonmedical prescription drug use at baseline. Other controls include completion of a bachelor's degree by age 35, and time-varying controls for marital status, employment status, and trouble sleeping in the past 30 days. Unadjusted and adjusted models also control for age (0=35, 1=40, 2=45, 3=50, 4=55). The ODUD outcome variable represents ≥2 other drug use disorder symptoms. All outcomes and the main independent variable are time-varying.

^aObservation counts show the total number of positive responses for the outcome (numerator) over the total number of observations in the given medical use group (denominator).