



Suicide Risk Among Young Recreational Ketamine Users in Taiwan

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45,038

young people aged 12–24 with a first ketamine-related record, 2010–2021, matched 1:10 to 450,380 ketamine-naïve peers

11.7×

higher rate of suicide attempt or suicide over 2 years: IRR 11.69 (95% CI 9.85–13.86)

16.3×

the excess among young women versus 9.4× among young men

6.6×

adjusted risk in the 2018–2021 cohort relative to 2010–2013 aHR 6.59 (95% CI 4.65–9.32)

1 Study question and background

Why suicide risk among young ketamine users is still unquantified

- Ketamine is a non-competitive NMDA receptor antagonist used in anesthesia and pain management and — since the 2019 approval of esketamine for treatment-resistant depression — increasingly in psychiatry.
- Non-medical use is widespread among adolescents and young adults across East Asia. In Taiwan, use is almost entirely recreational, typically snorted or smoked, and peaked in the early-to-mid 2010s.
- Recreational use has been linked to depression, anxiety, and other psychiatric problems, yet population-based evidence on suicidal behavior in young users remains scarce.
- Existing evidence comes mainly from treatment-seeking or clinic samples that are cross-sectional and selected on symptom severity — constraining estimates of absolute risk and of how that risk is changing.

THE QUESTION

- Do young people with a documented ketamine-use record have higher rates of suicide attempts and suicide than matched peers?
- Does such excess have subgroup heterogeneity (e.g., gender)?

2 Methods

Linked nationwide administrative and health databases, Taiwan

Design and cohorts

- Retrospective matched cohort built from Taiwan’s linked nationwide administrative and health databases.
- Ketamine cohort: 45,038 individuals aged 12–24 with an incident ketamine-related record, 2010–2021, after a 2001–2009 washout.
- Comparison cohort: 450,380 ketamine-naïve individuals, matched 1:10 on sex, age group, insured income level, region and index period.
- Index date = the first ketamine-related record; all participants followed for 2 years.

Outcomes and covariates

- Primary outcome: suicide attempt (emergence room and inpatient services among National Health Insurance records) or suicide death (national mortality registry) within 2 years.
- Secondary outcomes: suicide attempt only; suicide (death) only.
- Demographic covariates: sex, age group, insured income level (household income proxy), calendar period.
- Prior-year covariates: illegal drug-use record, other substance use at the index episode, depression, anxiety, insomnia, schizophrenia and ADHD.

Statistical analysis

- χ^2 tests comparing baseline characteristics between the two cohorts.
- Incidence rates per 1,000 person-years and incidence rate ratios (IRR), stratified by sex, age group, and index period.
- Cox proportional hazards models (HR) among ketamine users; five nested specifications, death treated as censoring.
- Sex-stratified crude and adjusted models testing whether associations differ for young men and young women.

3 Key findings

Ketamine cohort (n = 45,038) vs. matched comparison cohort (n = 450,380)

A Who used ketamine?

Characteristic, %	Ketamine n = 45,038	Comparison n = 450,380
Female	19.3	19.3
Aged 12–17 at index	10.1	10.1
Insured income level 1 (lowest)	62.3	62.3
Illegal drug-use record, prior year	11.7	0.15
Other substance use at index episode	11.6	<0.01
Any drug-use record within 2 y	19.0	0.32
≥1 further ketamine record, 2 y	39.3	0.12
Suicide attempt, 2 y	0.63	0.05
Suicide (death), 2 y	0.16	0.01

Table 1. Cohorts matched 1:10 on sex, age group, insured income level, region and index period, so those rows are identical by design; all other between-cohort differences $p < 0.0001$ (χ^2).

C What predicts a suicide attempt/suicide?

Characteristic	Crude HR (95% CI)	Adjusted HR (95% CI)
Female (ref: male)	3.53 (2.80–4.46)	2.96 (2.31–3.78)
Aged 18–24 (ref: 12–17)	0.73 (0.52–1.02)	0.81 (0.57–1.16)
Income level 1, lowest (ref: level 3)	1.82 (0.90–3.68)	1.53 (0.76–3.11)
Period 2014–2017 (ref: 2010–2013)	3.57 (2.57–4.95)	3.42 (2.46–4.77)
Period 2018–2021 (ref: 2010–2013)	7.24 (5.15–10.17)	6.59 (4.65–9.32)
Depression, prior year	5.88 (4.34–7.96)	2.49 (1.69–3.67)
Insomnia, prior year	6.11 (4.52–8.25)	1.98 (1.29–3.04)
Illegal drug-use record, prior year	1.24 (0.89–1.73)	1.11 (0.79–1.57)
Other substance use at index episode	1.11 (0.78–1.57)	0.87 (0.61–1.25)

Table 3. Cox proportional hazards models for suicide attempt, fitted among ketamine users only (n = 45,038; 285 events). The crude column fits each covariate on its own; the adjusted column fits all covariates shown together. Death is treated as censoring, so these are cause-specific hazard ratios.

Red = 95% CI excludes 1.

B Suicide attempt or suicide: rates and adjusted rate ratios

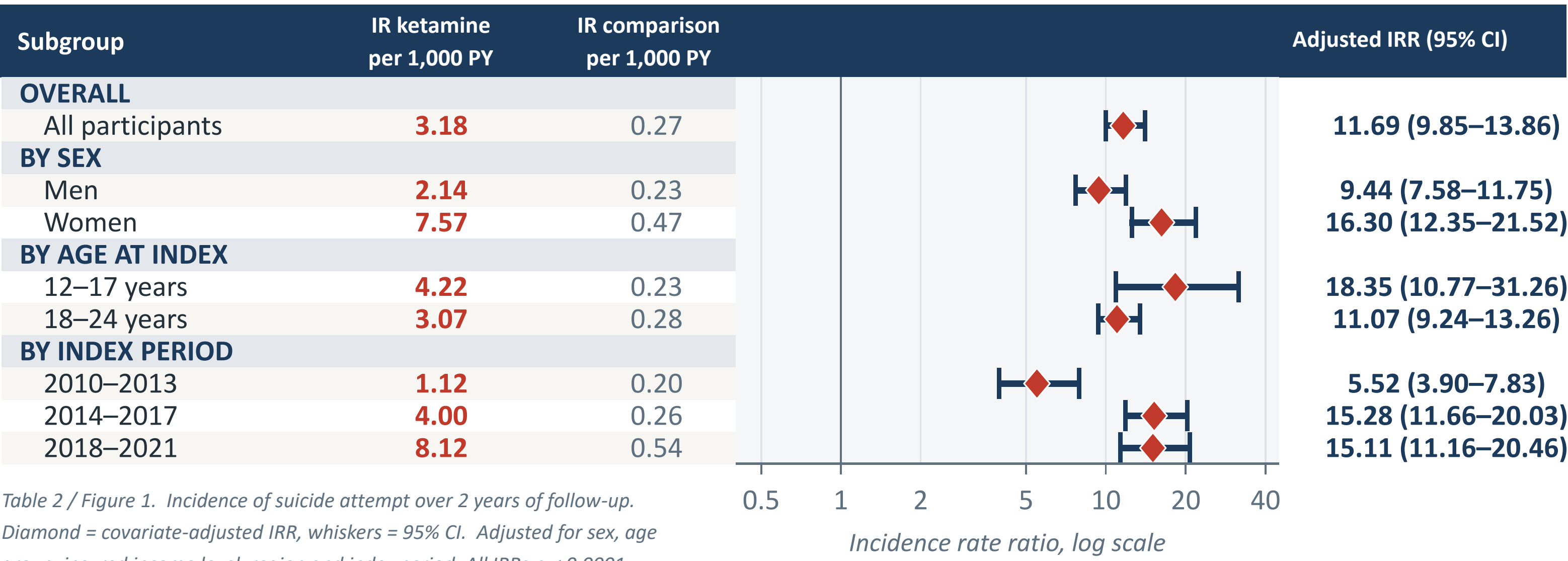


Table 2 / Figure 1. Incidence of suicide attempt over 2 years of follow-up. Diamond = covariate-adjusted IRR, whiskers = 95% CI. Adjusted for sex, age group, insured income level, region and index period. All IRRs $p < 0.0001$.

D What predicts suicide death?

Characteristic	Adjusted HR (95% CI)	P
Female (ref: male)	0.54 (0.27–1.05)	0.068
Aged 18–24 (ref: 12–17)	2.84 (0.69–11.71)	0.149
2014–2017 (ref: 2010–2013)	1.05 (0.62–1.78)	0.866
2018–2021 (ref: 2010–2013)	1.13 (0.59–2.15)	0.711
Depression, prior year	3.19 (1.48–6.90)	0.003
Anxiety, prior year	1.27 (0.54–3.03)	0.585
Illegal drug use, prior year	0.98 (0.47–2.03)	0.952
Other substance use at index	1.01 (0.49–2.08)	0.971

Table 4. Cox proportional hazards model for suicide death among ketamine users (71 events), adjusted for all covariates shown. Insured income level was not estimable (no deaths in the highest income stratum).

E Young men and young women differ (suicide attempt/suicide)

Characteristic	Men — aHR	Women — aHR
Aged 18–24 (ref: 12–17)	1.09 (0.66–1.81)	0.75 (0.47–1.19)
2014–2017 (ref: 2010–2013)	2.18 (1.55–3.06)	2.83 (1.79–4.49)
2018–2021 (ref: 2010–2013)	3.18 (2.18–4.63)	6.25 (3.87–10.08)
Depression, prior year	2.17 (1.25–3.76)	3.35 (2.12–5.28)
Anxiety, prior year	0.97 (0.52–1.82)	2.07 (1.28–3.34)
Insomnia, prior year	3.14 (1.84–5.37)	1.39 (0.82–2.36)

Table 5. Sex-stratified adjusted models.

- Prior-year insomnia and depression are the only predictors of suicide death (aHR 3.45 and 3.19).
- Female sex and the steep rise across index periods predict attempts, not deaths.
- The widening across cohorts is steeper in young women (6.25× vs 3.18× for 2018–2021).
- Prior-year anxiety predicts risk only in young women; insomnia only in young men.

4 Conclusion and implications for Zero Suicide practice

Conclusion

- Young people with a documented ketamine-use record had roughly twelve times the 2-year rate of suicide attempt or suicide of matched peers; the excess was largest in young women ($\approx 16\times$).
- The disparity widened across successive cohorts, and prior-year depression, insomnia and anxiety were the strongest modifiable correlates.

What this means for suicide prevention

- IDENTIFY: make suicide-risk screening routine at every ketamine-related contact: criminal-justice diversion and community drug-prevention centers.
- ENGAGE AND TREAT: deliver depression and anxiety care inside substance-use case management rather than referring out, and tailor it by sex.
- IMPROVE: link drug-offense administrative records to health and mortality data so suicide outcomes can be tracked as a system-level Zero Suicide indicator.

Limitations

- Ketamine use ascertained from criminal-justice and government reporting records — limited generalizability to community users.
- No measure of dose, frequency or route of use.
- Attempts not reaching medical care are not captured.