

# Suicide mortality among individuals with gambling disorder: A comparative cohort study using Norwegian health registry data

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# Background

- A minority of individuals participating in gambling lose control and develop gambling disorder (GD)
  - Prevalence of GD: 0.4% to 0.6% of the general population
  - Prevalence of subsyndromal GD symptoms → problem gambling (PG): 0.2% to 2.0% of the general population
- GD/PG is associated with severe adverse effects for both the individual and their close ones:
  - Financial strain
  - Relationship breakdowns
  - Job loss
  - Legal problems
  - Significant emotional distress
  - Decrements in somatic- and mental health
- Suggests that individuals with GD/PG may be at an increased risk of suicidality

Potenza et al. Nature Reviews Disease Primers 2019; 5(1): Article 51  
Gabellini et al., J Gambl Stud 2023; 39(3): 1027-1057  
Langham et al. BMC Public Health 2016; 16(1): Article 80



# Background

- Numerous studies show that suicidal ideation and suicide attempts are common among individuals with GD/PG
- Recent meta-analysis of 107 primary studies on PG:
  - Prevalence of lifetime suicidal ideation = 31.6%
  - Prevalence of lifetime suicide attempt(s) = 13.2%
- Individuals with PG have 2-3 times higher odds of reporting suicidal ideation/suicide attempts compared to individuals without PG



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## Suicidality Among Individuals With Gambling Problems: A Meta-Analytic Literature Review

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Gambling problems have consistently been linked to suicidality, including suicidal ideation, attempts, and suicide. However, the magnitude of the relationship has varied significantly across studies and the potential causal link between gambling problems and suicidality is currently unclear. A meta-analytic literature review was conducted to (a) synthesize pooled prevalence rates of suicidality among individuals with gambling problems; (b) determine if individuals with gambling problems had an increased likelihood of reporting suicidality compared to individuals without gambling problems; and (c) review evidence on causality and directionality. A search in Web of Science, APA PsycInfo, APA PsycNet, Medline, CINAHL, ProQuest, Embase, and Google Scholar electronic databases identified 107 unique studies ( $N = 4,691,899$ ) that were included for review. Studies were included if they were available in any European language and provided sufficient data for the calculation of prevalence rates or effect sizes. Two researchers examined the data independently using a predefined coding schema that included the Newcastle-Ottawa Quality Assessment Scale. Random-effects meta-analysis yielded pooled prevalence rates of 31.6% (95% CI [29.1%, 34.3%]) for lifetime suicidal ideation and 13.2% (95% CI [11.3%, 15.5%]) for lifetime suicide attempts. Individuals with gambling problems had significantly increased odds of reporting lifetime suicidal ideation ( $OR = 2.17$ , 95% CI [1.90, 2.48]) and lifetime suicide attempts ( $OR = 2.81$ , 95% CI [2.23, 3.54]) compared to individuals without gambling problems. Two studies reported that individuals with pathological gambling had an increased risk of dying by suicide. Meta-regression analyses suggested that the risk of study bias was positively related to the prevalence rates of suicidal ideation. Sex proportions were found to moderate the odds of suicidal ideation, but the direction of the effect was inconsistent. For suicide attempts, psychiatric comorbidity and sample size were positively and inversely, respectively, associated with prevalence rates. The synthesis indicates that suicidality is common among individuals with gambling problems and hence should be addressed by help agencies. Inferences on causality and directionality are hampered by a lack of longitudinal studies.

### Public Significance Statement

This meta-analytic literature review of 107 studies shows that lifetime suicidal ideation and suicide attempts are commonly reported among individuals with gambling problems and that individuals with gambling problems have an increased likelihood of reporting lifetime suicidal ideation, suicide attempts, and dying by suicide compared to the general population. The observed increased likelihood of suicidality should be noted and addressed by help agencies and policy makers. Little is known about the directionality and mechanisms underlying this relationship, which needs to be investigated in future high-quality longitudinal research.

**Keywords:** pathological gambling, gambling disorder, suicide, self-harm, meta-analysis

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# Background

- Relatively few studies have investigated the association between GD/PG and suicide mortality
  - Most of these have used ecological designs or forensic/psychological autopsy studies of gambling-related suicides
    - Such designs cannot be used to estimate the risk of suicide mortality associated with GD/PG



# Previous cohort studies

## Karlsson & Håkansson, 2018:

- Register study combining data from the National patient registry and the Cause of death registry, 2005-2016
- N = 2099 Swedish individuals diagnosed with GD (ICD-10: F63.0)
- Standardized mortality ratios (SMR) = 15.1

## Pavarin et al., 2021:

- Register study combining data from regional hospital records and the Cause of death registry, Emilia-Romagna region, Italy, 1992-2018
- N = 826 Italian individuals diagnosed with GD (ICD-10: F63.0)
- SMR men and women = 3.3 (not statistically significant)

FULL-LENGTH REPORT

*Journal of Behavioral Addictions* 7(4), pp. 1091–1099 (2018)

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## Gambling disorder, increased mortality, suicidality, and associated comorbidity: A longitudinal nationwide register study

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## Mortality risk in a population of patients treated for gambling disorders: results of a follow-up study

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# Previous cohort studies

- Previous studies have only compared suicide risk among patients with GD to the general population
- It is currently unclear whether patients with GD are at a different suicide risk compared to other specific risk groups for suicide → e.g., patients with psychiatric conditions other than GD



# Aim of the present study

- Examine the risk of suicide mortality among Norwegian patients with gambling disorder compared to the general population
- Compare the risk of suicide mortality to other patient groups



# Method

- Registry-based cohort study employing individual-level linked data and aggregated data from Norwegian population-level sources:
  - National patient registry (NPR)
    - Holds individual-level patient data, including diagnoses (ICD-10 codes), from all public and private contract specialist healthcare services requiring referral from primary healthcare providers for access in Norway.
  - Cause of death registry (CDR)
    - Nationwide health registry that has almost full coverage (98%) of all deaths of Norwegian residents.
    - The registered underlying cause of death (ICD-10 codes) is based on the death certificate by the attending physician
  - Data linkage based on patients' unique national identification number





# Method

- Study period: January 1, 2008, to December 31, 2021
- Study population: All adult patients treated for gambling disorder in specialist health services in Norway between 2008 and 2021,  $n = 6,899$
- Main outcome: suicide mortality (intentional self-harm; ICD-10 codes X60-X84 or Y87)

Comparing suicide risk to the general population:

- Standardized mortality ratios (SMRs) adjusted for sex, age, and calendar variations
- Based on suicide rates in the general population provided by the CDR

Comparing suicide risk to other patient groups:

- 12 different NPR patient groups
  - Patients diagnosed with a random psychiatric condition
  - Patients diagnosed with a random somatic condition
  - 7 patient groups based on the broad categories of Chapter V in the ICD-10
  - Patients diagnosed with depression
  - Patients diagnosed with alcohol dependency
- Sample size of the comparison groups: 6 times the study population (GD)
- Totally, 391,897 patients were included in comparison groups
- Cox proportional hazards regression models adjusted for age, sex, and calendar effects



# Results

- During the study period (2008-2021), 148 of 6,899 patients with gambling disorder died.
- 37 (32 men, 5 women) died by suicide
- Suicide was the leading cause of death (25.0%, n=37) followed by neoplasms (24.3%, n=36), diseases of the circulatory system (14.2%, n=21), and accidental poisoning (12.8%, n=19)



# Results: The risk of suicide mortality compared to the general population

Sex	Age group	Person-years	Observed suicide mortality	CMR per 1000 person-years	SMR (95% CI)
Men and women	Age 20-89	38,748.5	37	0.955	5.12 (3.71, 7.06)
	Age 20-49	30,372.5	27	0.889	4.75 ( 3.26, 6.93)
	Age 50-89	8,376.0	10	1.194	6.46 (3.48, 12.01)
Men	Age 20-89	31,778.5	32	1.007	4.88 (3.45, 6.90)
Women	Age 20-89	7,186.5	5	0.696	7.43 (3.09, 17.84)

## SMR analysis stratified on psychiatric comorbidity:

- With comorbidity: SMR = 6.93 (95% CI [4.85, 9.91])
- Without comorbidity: SMR = 2.41 (95% CI [1.15, 5.06])



# Results: The risk of suicide mortality compared to other patient groups

Reference group (ICD-10 codes)	N	Person-years	Observed suicide mortality	Crude suicide mortality rate per 1,000 person-years	Hazard ratio adjusted for age (95% CI)	Hazard ratio adjusted for age and sex (95% CI)
Random mental/behavioral disorder (F10-F99)	42,096	232,913	114	0.49	1.82 (1.25, 2.67)**	1.44 (0.97, 2.14)
Random somatic condition (Chapters A, B, C, D, E, G, H, I, J, K, L, M, N, P, Q)	42,095	231,970	26	0.11	7.28 (4.32, 12.27)***	6.36 (3.67, 11.00)*** <sup>1</sup>
Substance use disorders (F10-F19)	42,096	220,956	368	1.67	0.55 (0.39, 0.78)***	0.53 (0.38, 0.75)***
Alcohol dependence syndrome (F10.2)	38,284	207,477	268	1.29	0.62 (0.44, 0.89)**	0.62 (0.43, 0.88)**
Psychotic disorders (F20- F29)	34,032	198, 867	396	1.99	0.42 (0.30, 0.59)*** <sup>1</sup>	0.40 (0.28, 0.56)*** <sup>1</sup>
Mood disorders (F30-F39)	42,093	229,457	240	1.04	1.01 (0.71, 1.45)	0.73 (0.51, 1.05)

# Results: The risk of suicide mortality compared to other patient groups

Reference group (ICD-10 codes)	N	Person-years	Observed suicide mortality	Crude suicide mortality rate per 1,000 person-years	Hazard ratio adjusted for age (95% CI)	Hazard ratio adjusted for age and sex (95% CI)
Depression (F32-F33)	42,096	230,940	163	0.71	1.41 (0.98, 2.04)	1.02 (0.70, 1.48)
Anxiety disorders (F40-F48)	42,095	234,421	115	0.49	1.98 (1.36, 2.90)***	1.35 (0.91, 2.0)
Behavioral syndromes associated with physiological disturbances and physical factors (F50- F59)	42,095	238,078	87	0.37	2.52 (1.69, 3.75)***	1.84 (1.17, 2.90)**
Personality disorders (F60- F69)	42,095	237,617	197	0.83	1.13 (0.80, 1.61)	0.94 (0.65, 1.35)
Developmental disorders (F80-89)	34,825	222,508	59	0.27	2.31 (1.40, 3.80)**	2.18 (1.31, 3.61)**
Behavioral and emotional disorders with onset usually occurring in childhood and adolescence (F90-F98)	42,096	240,833	67	0.28	2.37 (1.53, 3.67)***	2.17 (1.39, 3.39)***

# Discussion

- Norwegian patients with GD had a 5-fold increase in suicide risk compared to the general population
- SMR estimate was lower than the estimate found in Sweden (SMR = 15.1)
  - Could be related to differences in diagnostic practices in Norway and Sweden
    - GD diagnosis is less frequently used in Sweden than Norway
    - Patients receiving a GD diagnosis in Sweden might represent the most severe cases



# Discussion

- Higher suicide risk among patients with GD than several (5) other patient comparison groups
- Similar risk as patients with anxiety disorders, personality disorders, and depression
- Lower risk compared to patients with psychotic disorders, mood disorders (in a sensitivity analysis), alcohol dependence, and substance use disorders
- Risk differences could be related to:
  - Characteristics inherent to the specific diagnoses
  - Associated comorbidity
  - Competing risks
  - Differences in help-seeking behaviors



# Key limitations

- Study design cannot conclude a possible causal link between GD and suicide
- Several potentially relevant variables are not included in the dataset:
  - Social variables, debt, traumatic life events, undiagnosed conditions etc.
- Potential selection bias → only included patients who sought specialized treatment







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