

# High Income, Employment, Postgraduate Education, and Marriage

## A Suicidal Cocktail Among Psychiatric Patients

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**Context:** Studies dating back over 100 years have shown that the risk of suicide in the general population is associated with low income, unemployment, educational underachievement, and singleness. However, little is known about the association between suicide risk and these factors in psychiatric patients.

**Objective:** To estimate the association between suicide risk, socioeconomic position, and marital status in psychiatric patients.

**Design, Setting, and Patients:** Population-based cohort study of all first-ever psychiatric patients aged 16 to 65 years admitted from 1981 to 1998, with administrative longitudinal data on income, labor market affiliation, educational attainment, and marital and cohabitational status (96 369 patients, 256 619 admissions, and 2727 suicides).

**Main Outcome Measures:** Suicide risks after hospital discharge were depicted using Kaplan-Meier product-limit methods. Hazard ratios (HRs) for suicide from Cox proportional hazards regression and case-crossover/individually stratified analyses were calculated while adjusting for overall social drift.

**Results:** Using Cox proportional hazards regression, compared with patients in the highest income quartile, the suicide HR decreased from 0.90 (95% confidence interval [CI],

0.79-1.02) in the third lowest to 0.83 (95% CI, 0.73-0.93) in the second lowest and to 0.68 (95% CI, 0.61-0.76) in the lowest income group. Compared with the fully employed, the HR for unemployed patients was 0.85 (95% CI, 0.77-0.93); for social benefits' recipients, 0.58 (95% CI, 0.48-0.70); and for disability or age pensioners, 0.63 (95% CI, 0.55-0.71). Compared with postgraduate education, HRs (95% CIs) associated with a bachelor's degree, vocational school, or primary school education were 0.82 (0.67-1.02), 0.66 (0.55-0.80), and 0.54 (0.44-0.65), respectively. The HRs (95% CIs) for widowed, divorced, and never-married patients were 1.07 (0.89-1.30), 0.74 (0.66-0.84), and 0.88 (0.79-0.98), respectively. Using individually stratified analyses, HRs (95% CIs) for transition into the third lowest, the second lowest, and the lowest income quartile were 1.19 (0.76-1.86), 1.47 (0.92-2.34), and 1.84 (1.14-2.97), respectively. The HRs (95% CIs) for patients who became unemployed, social benefits' recipients, disability or age pensioners, widowed patients, and divorced patients were 1.41 (1.01-1.95), 1.73 (1.06-2.80), 1.45 (0.91-2.30), 2.59 (0.76-8.89), and 1.86 (1.07-3.21), respectively.

**Conclusions:** Suicide risk is generally associated with low income, unemployment, educational underachievement, and singleness, but this study suggests that the opposite is true among psychiatric patients. However, loss of income, labor market status, and marriage increase the suicide risk.

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**R**ESearch dating back over 100 years has highlighted that risk of suicide is associated with low income, unemployment, educational underachievement, and singleness.<sup>1</sup> While studies repeatedly have replicated these findings in the general population,<sup>2-6</sup> a similar consistency between suicide and these factors has not been seen in people with psychiatric disorders.<sup>7-9</sup>

Suicide prevention in psychiatric patients is important, because almost every second person who dies by suicide has previously been admitted with a psychiatric disorder<sup>10,11</sup> and because more than 90% of individuals who die by suicide have a diagnosable psychiatric illness.<sup>12</sup> Studies

of suicide in psychiatric patients have suggested that low income, unemployment, low educational attainment, and singleness are associated with an increased<sup>9,13-15</sup> and with a decreased<sup>16-18</sup> suicide risk. Studies of suicide in psychiatric patients often fail to take hospital readmissions into account. This might be crucial for the following reasons: (1) income, employment and labor market affiliation, educational achievement, singleness, illness severity, and suicidality<sup>19-22</sup> predict both suicide and readmission; (2) high readmission rates are observed in patients with depression (50%) and schizophrenia (80%)<sup>23,24</sup>, and (3) inpatient psychiatric treatment restrains individuals from committing suicide.

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For this study, Denmark's rich series of health, social, and economic registers are used. All suicides, psychiatric admissions, and individual information on socioeconomic circumstances are recorded for the entire population. The goal is to estimate the risk of suicide associated with income, labor market affiliation, educational attainment, and marital status in a large representative sample of former psychiatric patients. An additional aim is to determine or investigate whether psychiatric readmission and longer hospital stay lower suicide risk.

## METHODS

### POPULATION-BASED REGISTERS

Data were obtained by linking Danish population-based registers using the unique personal identification number, which is assigned to all persons living in Denmark and used across all registration systems.<sup>25</sup>

The Danish Medical Register on Vital Statistics contains dates and causes of all deaths in Denmark recorded from the Cause-of-Death Certificates since 1976 and for suicide since 1970.<sup>26</sup> Suicide was defined as *International Classification of Diseases, Revision 8 (ICD-8)*<sup>27</sup> codes E950 to E959 and *International Statistical Classification of Diseases, 10th Revision (ICD-10)*<sup>28</sup> codes X60 to X84.

The Danish Psychiatric Central Register includes all admission and discharge dates and diagnoses according to the World Health Organization *ICD-8* and *ICD-10* classification of all psychiatric inpatient facilities in Denmark since 1969.<sup>29</sup> There are no private psychiatric hospitals in Denmark, and all treatment is free of charge.

The Integrated Database for Longitudinal Labor Market Research<sup>30</sup> covers the entire population and contains yearly information from 1980 onward, with information from administrative registers on individuals who were living in Denmark on January 1.

The database used in this study covers all suicides until January 1, 1998; psychiatric admissions until 1999; and socioeconomic and other social information until 1998.

### STUDY POPULATION

The study population included 96 369 individuals aged 16 to 65 years who were first ever admitted to a psychiatric hospital from 1981 to 1998. In this population, 3407 suicides, 256 619 (re)admissions, and 12 169 deaths occurred. Patients were followed up from each discharge until death or psychiatric readmission. Patients who die during admission are discharged the same day, which means that these patients cannot be distinguished from patients who are first discharged and then die within the same day. Because the primary focus of this study is suicide among discharged patients, 680 admissions were excluded in most analyses because the patients died by suicide during the admission or the same day as they were discharged, which cannot be distinguished (ie, 2727 suicides were kept in the analyses). However, the robustness of the results will be tested in separate analyses with these patients. Because the goal of this study was to examine the impact of risk factors on suicide, these numbers comprise admissions during which individuals were discharged alive, and only the first 68 discharges were considered because no suicide occurred among people admitted more frequently.

### PSYCHIATRIC DIAGNOSES

Diagnoses at index hospitalizations were categorized as depression (*ICD-8* code 296.09 or 296.29 or *ICD-10* code F32.0-F32.9), schizophrenia (*ICD-8* code 295 or *ICD-10* code F20), mania (*ICD-8* code 296.19 or 296.39 or *ICD-10* code F30.0-F30.9 or F38.00), alcohol misuse (*ICD-8* code 291 or 303 or *ICD-10* code F102), and all other. Length of admission and age were assessed at each discharge.

### SOCIOECONOMIC FACTORS AND MARITAL STATUS

Socioeconomic and marital factors were assessed at the end of the year preceding each discharge. Gross annual income (wages, pensions, unemployment and Social Security benefits, and interest rates) was grouped into age-sex-year population-based quartiles (ie, also based on those who had never been hospitalized). Labor market affiliation during a year was categorized as follows: (1) fully employed or self-employed, (2) unemployed longer than 1% of the year and receiving unemployment benefits, (3) recipient of other social benefits, (4) disability or age pensioners, (5) students, and (6) others outside the labor market (eg, housewives without labor market attachment and adolescents aged 16-18 years). Educational attainment was defined categorically: primary school, high school only, vocational training, bachelor's degree and high school plus 3 to 4 years of education, university master's or doctorate degree, and a category of persons without any information, who could be immigrants or persons who had not finished an education. Legal conjugal and cohabitational status on December 31 was combined into the following categories: (1) married and sharing address with the spouse, (2) cohabitating (ie, sharing address with a non-first-degree relative of the opposite sex, with the age difference being <15 years), (3) widow or widower and living alone, (4) divorced and living alone, (5) separated (ie, married and living alone), and (6) never legally married (using information stemming from 1924<sup>31</sup>). Further details on these factors are published elsewhere.<sup>4</sup>

### STATISTICAL ANALYSIS

Summary statistics were constructed using frequencies, proportions, and ratios for categorical data and medians for continuous variables.<sup>32</sup> The Kaplan-Meier product-limit estimator was used to estimate the proportion of individuals who committed suicide and who were readmitted to a psychiatric hospital as a function of time since the latest discharge.<sup>33</sup> The Aalen-Johansen estimator was used to estimate the probability (ie, cumulative risk) of suicide among patients who were not readmitted.<sup>34</sup> Readmission and other causes of death were considered as censoring for suicide, and vice versa, while emigration/immigration was dealt with a covariate because only the year and not the exact emigration/immigration date was known. Hazard ratio (HR) estimates of the association between covariates and the suicide risk were obtained by Cox proportional hazards models.<sup>33</sup> Individuals were often discharged several times, and robust standard error estimates were, therefore, used.<sup>35</sup> These analyses were intended to describe how individuals who died by suicide differed from other patients.

To focus on individual risk factor changes between admissions, the suicide risk was subsequently examined in individually stratified analyses, known as Cox proportional hazards analyses with unspecified frailty<sup>33</sup> or case-crossover analyses.<sup>36</sup> An individual who committed suicide was compared with himself or herself at earlier discharges and, therefore, only changes

**Table 1. Patient Baseline Characteristics at the Index Hospitalization**

Characteristic in the Year Before Discharge	Suicides (n = 2727) <sup>a</sup>	Discharges (n = 96 369) <sup>a</sup>	Suicide Risk, % <sup>b</sup>	Suicide Risk Ratio <sup>b</sup>
Gross income				
Highest quartile	591	17 749	3.33 (3.07-3.59)	1 [Reference]
Third quartile	542	17 345	3.12 (2.87-3.38)	0.94 (0.84-1.05)
Second quartile	612	21 770	2.81 (2.59-3.03)	0.84 (0.76-0.94)
Lowest quartile	959	37 344	2.57 (2.41-2.73)	0.77 (0.70-0.85)
Labor market affiliation				
Fully employed	1309	37 270	3.51 (3.33-3.70)	1 [Reference]
Unemployed	836	32 455	2.58 (2.40-2.75)	0.73 (0.67-0.80)
Social benefits' recipient	63	5261	1.20 (0.90-1.49)	0.34 (0.27-0.44)
Disability or age pensioner	236	9587	2.46 (2.15-2.77)	0.70 (0.61-0.80)
Student	57	2837	2.01 (1.49-2.53)	0.57 (0.44-0.74)
Otherwise not fully employed	203	6798	2.99 (2.58-3.39)	0.85 (0.74-0.98)
Educational achievement				
Postgraduate degree	123	2358	5.22 (4.32-6.11)	1 [Reference]
Bachelor's degree or high school plus 3-4 y of education	304	8130	3.74 (3.33-4.15)	0.72 (0.58-0.88)
Vocational training	802	25 026	3.20 (2.99-3.42)	0.61 (0.51-0.74)
High school	142	4294	3.31 (2.77-3.84)	0.63 (0.50-0.80)
Primary school (9 or 10 y)	1166	47 536	2.45 (2.31-2.59)	0.47 (0.39-0.56)
Unknown	167	6864	2.43 (2.07-2.80)	0.47 (0.37-0.59)
Marital status as of January 1				
Married and living with spouse	1170	33 675	3.47 (3.28-3.67)	1 [Reference]
Cohabitant and living with partner	244	10 135	2.41 (2.11-2.71)	0.69 (0.60-0.79)
Widow or widower and living alone	109	3007	3.62 (2.96-4.29)	1.04 (0.86-1.27)
Divorced and living alone	266	11 001	2.42 (2.13-2.71)	0.70 (0.61-0.79)
Separated (ie, married and living alone)	176	5401	3.26 (2.79-3.73)	0.94 (0.80-1.10)
Never legally married and living alone	739	30 989	2.38 (2.21-2.55)	0.69 (0.63-0.75)
Living abroad, emigrated, or immigrated <sup>c</sup>	23	2161	1.06 (0.63-1.50)	0.37 (0.25-0.56)
No. of admissions				
1	1293	51 452	2.51 (2.38-2.65)	1 [Reference]
2	594	17 899	3.32 (3.06-3.58)	1.32 (1.20-1.45)
3-5	523	17 156	3.05 (2.79-3.31)	1.21 (1.10-1.34)
6-10	230	6679	3.44 (3.01-3.88)	1.37 (1.19-1.57)
11-24	78	2743	2.84 (2.22-3.47)	1.13 (0.90-1.42)
≥25	9	440	2.05 (0.72-3.37)	0.81 (0.43-1.56)
Diagnosis at the index hospitalization				
Depression	288	6825	4.22 (3.74-4.70)	1 [Reference]
Schizophrenia	101	3729	2.71 (2.19-3.23)	0.64 (0.51-0.80)
Manic disorder	59	1368	4.31 (3.24-5.39)	1.02 (0.78-1.34)
Alcohol misuse	430	14 575	2.95 (2.68-3.22)	0.70 (0.60-0.81)
All other psychiatric disorders	1849	69 872	2.65 (2.53-2.77)	0.63 (0.56-0.71)
Length of admission, median (IQR), d	16 (5-39)	18 (5-49)	NA	NA
Age at index discharge, median (IQR), y	41 (31-51)	37 (27-48)	NA	NA
Sex				
Female	1100	49 092	2.24 (2.11-2.37)	1 [Reference]
Male	1627	47 277	3.44 (3.28-3.61)	1.54 (1.42-1.66)

Abbreviations: IQR, interquartile range; NA, data not applicable.

<sup>a</sup>Data are given as number in each group unless otherwise indicated.

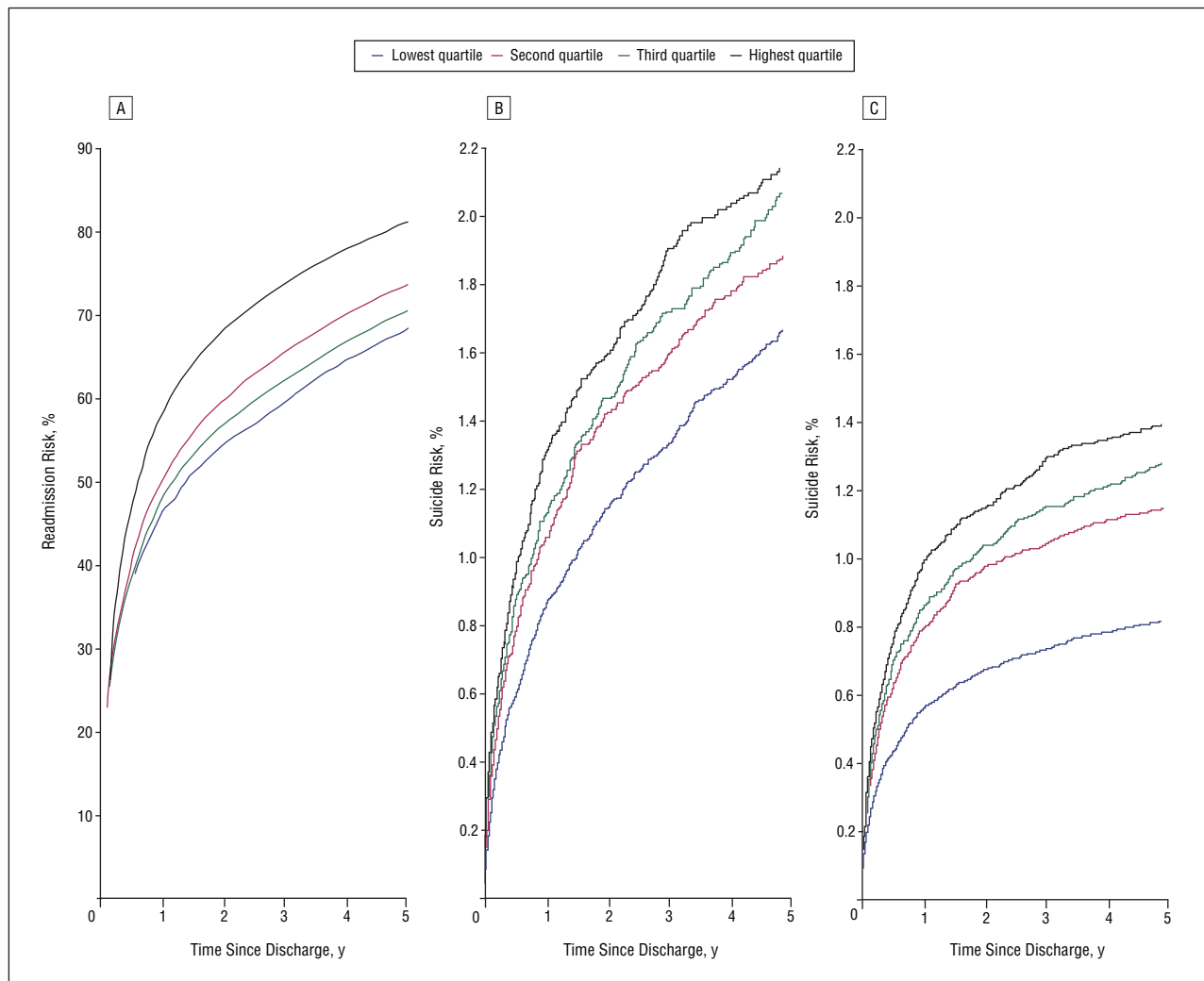
<sup>b</sup>Data in parentheses are 95% confidence intervals. The risk and risk ratio estimates might be misleading because the follow-up time is disregarded.

<sup>c</sup>Income, labor market affiliation, educational attainment, and marital status are only known for individuals who live in the country.

in risk factors could be studied. Patients who were only admitted once did not contribute with information in the analyses. Although this analytic strategy implicitly adjusted for all previous observed and unobserved factors, such as genetic predisposition or susceptibility, this strategy might be subject to bias caused by risk factor trends.<sup>37</sup> To counterbalance such trends, each factor at every discharge was replaced by the same factor, but subtracted by the average exposure among other patients with the same diagnosis, sex, and age ( $\pm 4$  years), so that each factor was adjusted for its expected trend over psychiatric admissions. The HR associated with deviation from this expected trajectory was obtained. Education was not included because an acquired education is permanently kept.

## RESULTS

The study included 96 369 patients, of whom 2727 died by suicide. Altogether, these patients were admitted 256 619 times. The baseline characteristics of the patients are shown in **Table 1**. Suicide was more frequent among patients with a higher income and a higher educational achievement, among patients who were fully employed or married, and among patients who were more frequently admitted or who had depression.



**Figure 1.** Kaplan-Meier plots of the risk of readmission (A) and suicide (B) and an Aalen-Johansen plot of the risk of suicide (C) in the 4 population-based income quartiles.

### SUICIDE RISK BASED ON KAPLAN-MEIER SURVIVAL CURVES

**Figure 1** contains plots of the risk of readmission and suicide in the 4 population-based income quartiles. Dose-response relationships were present because the lower the income, the higher the readmission risk (eg, after 5 years [1825 days], 79.0%, 71.1%, 67.8%, and 65.4% of patients in the lowest income quartile, second lowest quartile, third lowest quartile, and the highest quartile, respectively, were readmitted). Contrary to the usual pattern between suicide risk and income, the suicide risk increased with increasing income. Although the suicide risks based on the Aalen-Johansen survival curves were considerably lower, the risk ratio between individuals in the highest and lowest income quartile was larger (eg, after 5 years, this risk ratio is 1.67 and 1.29, respectively, because individuals with a lower income were more readily readmitted). Kaplan-Meier survival curves correspond to a hypothetical situation without readmissions, whereas Aalen-Johansen curves estimate suicide risk among those who have not been readmitted.<sup>34</sup>

Kaplan-Meier survival curves in relation to labor market affiliation, educational attainment, and marital status are shown in **Figure 2**. Contrary to findings in the general population, patients who were fully employed, who had a postgraduate or bachelor's degree, or who were married were at increased risk of suicide. The 5-year risks (95% confidence intervals) of suicide for patients who were fully employed, disability or age pensioners, unemployed, or social benefits recipients; had a postgraduate education, bachelor's degree, high school education, or primary school degree; and were married or living alone were 2.21 (2.06-2.35), 1.79 (1.59-2.00), 1.65 (1.52-1.78), and 1.27 (1.00-1.54); 3.29 (2.64-3.93), 2.40 (2.10-2.69), 2.05 (1.66-2.44), and 1.51 (1.41-1.61); and 2.23 (2.09-2.38) and 1.68 (1.57-1.78), respectively. To maintain clarity, data for the subgroup of those who were students, those who were otherwise not fully employed, and those with unknown educational attainment are not shown, and those who were living alone were treated as a single category. The analogous curves for hospital readmission showed basically the opposite pattern as in Figure 1 (results not shown).

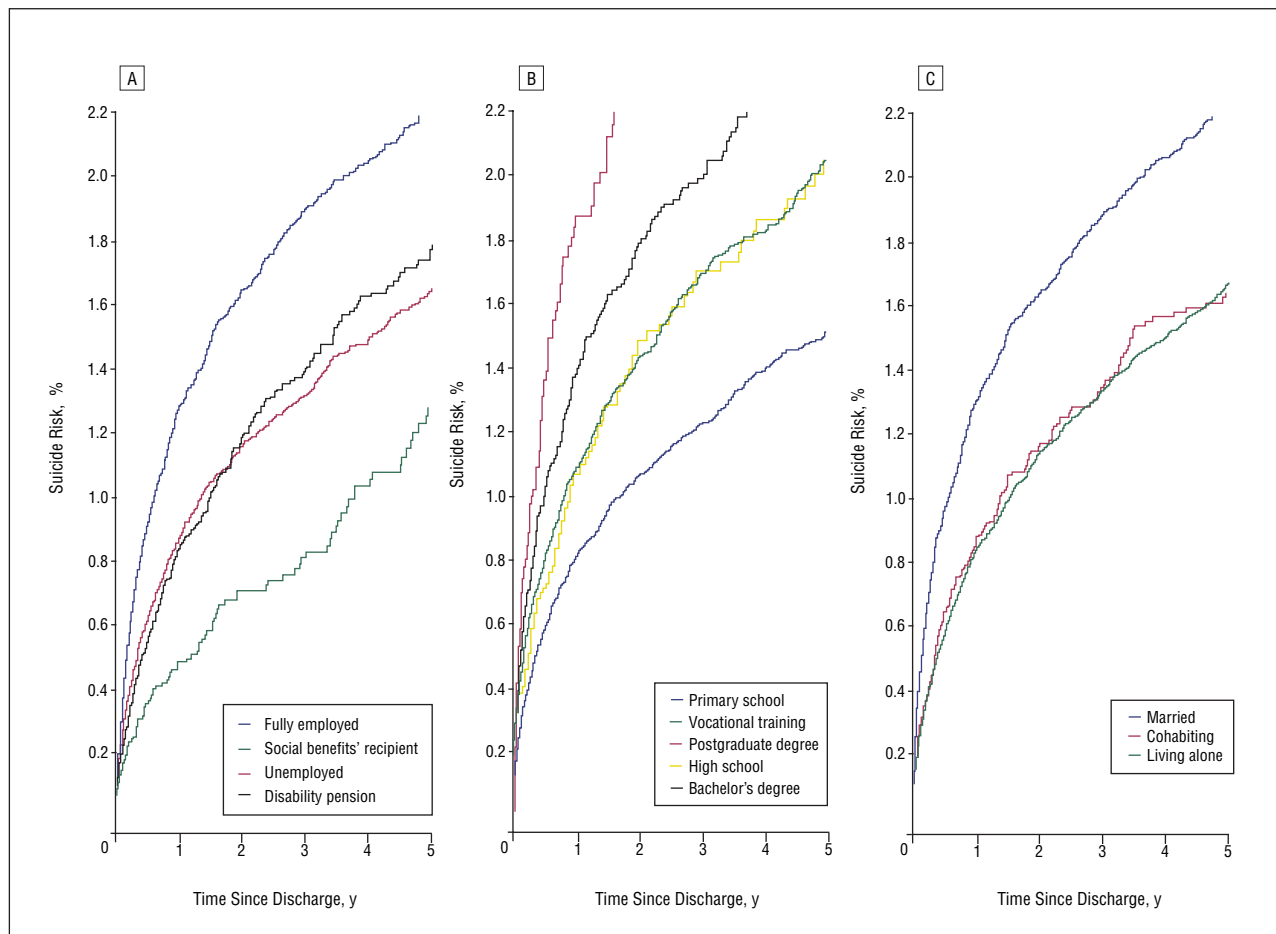


Figure 2. Kaplan-Meier survival curves in relation to labor market affiliation (A), educational attainment (B), and marital status (C).

### SURVIVAL ANALYSIS BASED ON COX PROPORTIONAL HAZARDS MODELS

The HR for suicide increased with increasing income (**Table 2**). Analogously, the suicide risk decreased among all groups of those who were not fully employed. Individuals who were unemployed experienced a higher risk than those who received disability pension or social benefits. The estimated associations suggested the suicide HR to decrease with decreasing educational attainment and the never married and divorced individuals to experience a lower suicide risk. These associations remained largely evident in subgroup analyses based on age, sex, diagnoses, and admission number, and similar results were obtained when readmissions were disregarded, when patients who died by suicide during admission were included, and when the analyses were stratified by psychiatric diagnoses (Table 2), calendar year, or age (results not shown). Although the HR was considerably higher among males (1.70; 95% confidence interval, 1.57-1.85), there was little evidence of an interaction effect with sex ( $P = .26$ ). The effect of labor market affiliation was much attenuated after controlling for education and marital status. These analyses showed how individuals who died by suicide differed from other patients, but they did not show the influence of risk factor changes on patients who died by suicide.

### INDIVIDUALLY STRATIFIED ANALYSES

At first, the individually stratified analyses seemed to conflict with previous findings (**Table 3**). However, this was not the case, because HRs were associated with transitions into the particular risk factor levels. The crude HR associated with the lowest income quartile suggested that patients in the lowest quartile, but who had been in a higher income quartile, experienced an almost 10-fold higher risk compared with patients who shifted into the highest quartile. Although the HRs were strongly attenuated, the gradually decreasing HR was still clearly evident after adjustment for the expected risk factor trend. Patients in the lowest income quartile experienced a 2-fold risk increase. The risk attenuation was primarily caused by the patient's predictable downward social drift. Analogously, patients with a weakened labor market affiliation were at a higher risk of suicide, and although the increase in risk was strongly attenuated by the expected labor market marginalization, the risk increase remained evident among the unemployed and those receiving social benefits. Patients who became single had a higher suicide risk than married patients, which seemed to be particularly evident for transitions into widowhood. The available information was not sufficient to detect a significant difference between the 5 psychiatric di-

**Table 2. Association Between Income, Labor Market Affiliation, Educational Attainment, Marital Status, and Risk of Suicide Among Patients Discharged From a Psychiatric Hospital**

Characteristic in the Year Before Discharge <sup>a</sup>	Diagnosis <sup>b</sup>						
	Crude (All Diagnoses) <sup>c</sup>	Depression <sup>c</sup>	Schizophrenia <sup>c</sup>	Mania <sup>c,d</sup>	Alcohol Misuse <sup>c</sup>	Other Disorders <sup>c</sup>	Adjusted (All Diagnoses) <sup>e</sup>
Gross income							
Third quartile	0.90 (0.79-1.02)	0.75 (0.52-1.08)	0.83 (0.34-2.01)	2.29 (1.03-5.12)	0.89 (0.63-1.26)	0.89 (0.77-1.04)	0.93 (0.82-1.05)
Second quartile	0.83 (0.73-0.93)	0.88 (0.62-1.24)	0.86 (0.39-1.87)	1.17 (0.48-2.85)	0.84 (0.61-1.15)	0.81 (0.70-0.94)	0.89 (0.79-1.00)
Lowest quartile	0.68 (0.61-0.76)	0.80 (0.57-1.13)	0.95 (0.48-1.88)	1.27 (0.57-2.82)	0.58 (0.43-0.78)	0.69 (0.60-0.79)	0.81 (0.71-0.92)
Labor market affiliation							
Unemployed	0.85 (0.77-0.93)	1.05 (0.75-1.47)	1.13 (0.71-1.82)	1.10 (0.56-2.16)	0.88 (0.71-1.10)	0.85 (0.75-0.95)	1.00 (0.87-1.16)
Social benefits' recipient	0.58 (0.48-0.70)	0.25 (0.04-1.80)	0.61 (0.33-1.15)	0.53 (0.07-4.11)	0.68 (0.43-1.08)	0.57 (0.45-0.73)	1.18 (0.98-1.44)
Disability or age pensioner	0.63 (0.55-0.71)	0.83 (0.55-1.27)	0.52 (0.30-0.90)	0.90 (0.38-2.13)	0.68 (0.48-0.96)	0.64 (0.54-0.74)	0.82 (0.72-0.93)
Student	0.91 (0.68-1.23)	1.28 (0.39-4.19)	0.28 (0.07-1.17)	1.22 (0.15-10.05)	1.31 (0.48-3.57)	0.99 (0.71-1.38)	1.05 (0.90-1.23)
Otherwise not fully employed	0.78 (0.67-0.91)	1.40 (0.93-2.11)	0.53 (0.23-1.22)	1.74 (0.79-3.86)	0.61 (0.35-1.06)	0.74 (0.61-0.89)	0.95 (0.85-1.07)
Educational achievement							
Bachelor's degree or high school plus 3-4 y of education	0.82 (0.67-1.02)	1.00 (0.53-1.89)	1.33 (0.53-3.38)	0.41 (0.14-1.20)	0.86 (0.50-1.47)	0.80 (0.62-1.04)	0.52 (0.41-0.65)
Vocational training	0.66 (0.55-0.80)	0.70 (0.38-1.28)	0.99 (0.44-2.24)	0.39 (0.16-1.00)	0.76 (0.47-1.23)	0.64 (0.51-0.81)	0.58 (0.48-0.70)
High school	0.89 (0.70-1.14)	1.45 (0.61-3.40)	0.78 (0.32-1.90)	1.52 (0.48-4.84)	1.03 (0.52-2.01)	0.86 (0.64-1.18)	0.97 (0.76-1.24)
Primary school (9 or 10 y)	0.54 (0.44-0.65)	0.74 (0.41-1.33)	0.60 (0.27-1.34)	0.51 (0.21-1.23)	0.55 (0.34-0.90)	0.52 (0.41-0.65)	0.70 (0.58-0.85)
Unknown	0.48 (0.38-0.60)	0.76 (0.37-1.57)	0.42 (0.14-1.28)	<sup>f</sup>	0.55 (0.30-1.02)	0.47 (0.35-0.62)	0.84 (0.68-1.04)
Marital status as of January 1							
Cohabitant and living with partner	0.99 (0.86-1.14)	0.61 (0.33-1.14)	1.11 (0.50-2.47)	1.42 (0.56-3.60)	0.85 (0.60-1.21)	1.11 (0.93-1.31)	0.94 (0.86-1.04)
Widow or widower and living alone	1.07 (0.89-1.30)	0.86 (0.49-1.52)	1.32 (0.27-6.49)	2.02 (0.73-5.62)	0.98 (0.56-1.69)	1.17 (0.93-1.48)	0.70 (0.57-0.85)
Divorced and living alone	0.74 (0.66-0.84)	0.83 (0.51-1.35)	0.48 (0.19-1.18)	1.28 (0.58-2.82)	0.71 (0.54-0.93)	0.82 (0.70-0.96)	0.72 (0.63-0.83)
Separated (ie, married and living alone)	0.99 (0.85-1.16)	1.37 (0.79-2.38)	<sup>f</sup>	1.08 (0.32-3.66)	1.18 (0.86-1.61)	1.01 (0.83-1.22)	0.90 (0.67-1.21)
Never legally married and living alone	0.88 (0.79-0.98)	0.86 (0.57-1.30)	0.91 (0.53-1.57)	1.07 (0.48-2.42)	0.73 (0.55-0.98)	0.98 (0.85-1.12)	0.87 (0.74-1.01)

<sup>a</sup>In each analysis, periods in which an individual is not living in Denmark constitute a separate category.

<sup>b</sup>Data are given as hazard ratio for suicide (95% confidence interval). The reference for gross income is the highest quartile; for labor market affiliation, fully employed; for educational achievement, postgraduate degree; and for marital status as of January 1, married and living with a spouse.

<sup>c</sup>Adjusted for sex, age (5-year groups), and calendar year (3-year groups) by regression and adjusted for discharge number by stratification.

<sup>d</sup>Based on only 59 patients with mania who died by suicide (the rates should be interpreted with caution).

<sup>e</sup>Adjusted for sex, age, year, psychiatric diagnoses (depression, schizophrenia, mania, alcohol misuse, and other), and length of admission (1-7, 8-14, 15-30, 31-90, 91-182, 183-365, and >365 days) by regression and adjusted for number of discharges by stratification. Furthermore, gross income is adjusted for marital status and labor market affiliation, but not for educational attainment, to avoid overadjustment. Labor market affiliation, educational achievement, and marital status are mutually adjusted, but not adjusted for gross income because income is a result of these vs an opposite.

<sup>f</sup>No suicide cases are exposed.

agnoses ( $P = .20$ ) or between sex ( $P = .17$ ). Furthermore, patients who were admitted for a longer period experienced a lower suicide risk (test for trend in the fully adjusted analysis:  $P = .001$ ).

#### COMMENT

At odds with the general pattern of suicide risk, the main finding in this article is that risk of suicide is higher in former psychiatric patients with a higher income and higher educational achievement and in patients who are fully employed or married. These findings, which are based on the entire Danish population, remain consistent across various analyses. However, patients who experience loss of income, job, or marriage experience a higher risk of suicide and, last, the results suggest that longer hospital stay and readmission might prevent suicide.

Richer, employed, educated, and married psychiatric patients may feel more stigmatized<sup>38,39</sup> and shameful<sup>40</sup> about

having a psychiatric illness. In the Durkheimian theory of social integration,<sup>1</sup> a rapid change in a person's societal context or network might lead to a state of anomie (ie, of normlessness, which increases the person's propensity toward suicide). Similarly, the "Status Integration Theory"<sup>41</sup> proposes that the greater the dissonance between a person's social environment, the greater is the person's risk of suicide. Although all individuals who are admitted with a psychiatric disorder experience a change of their social environment, the richer, employed, educated, and married patients who have managed well earlier in life might be more alienated when they are suddenly among the poorer, unemployed, undereducated, and unmarried patients. Downward social drift is a concomitant of psychiatric disorders,<sup>42,43</sup> and patients who have coped well earlier might be in a particularly stressful situation caused by fear or risk of losing socioeconomic position,<sup>44</sup> income, job, marriage, or ability to use their education. This is a warranted concern, because patients who actually experience loss of

**Table 3. Association Between Income, Labor Market Affiliation, Marital Status, and the Risk of Suicide in Individual Stratified Analyses<sup>a</sup>**

Characteristic in the Year Before Discharge <sup>b</sup>	Crude Data <sup>c</sup>	Data After First Adjustment <sup>d</sup>	Data After Second Adjustment <sup>e</sup>
Gross income			
Third quartile	1.90 (1.14-3.18)	1.18 (0.77-1.81)	1.19 (0.76-1.86)
Second quartile	3.71 (2.17-6.35)	1.44 (0.92-2.26)	1.47 (0.92-2.34)
Lowest quartile	9.68 (5.55-16.88)	1.93 (1.23-3.03)	1.84 (1.14-2.97)
Labor market affiliation			
Unemployed	2.05 (1.40-3.00)	1.50 (1.09-2.07)	1.41 (1.01-1.95)
Social benefits' recipient	5.96 (3.32-10.70)	1.77 (1.10-2.83)	1.73 (1.06-2.80)
Disability or age pensioner	142.80 (49.50-412.10)	1.60 (1.02-2.50)	1.45 (0.91-2.30)
Student	1.62 (0.64-4.07)	1.23 (0.56-2.68)	1.13 (0.51-2.52)
Otherwise not fully employed	2.04 (1.21-3.46)	0.94 (0.60-1.48)	0.89 (0.56-1.41)
Marital status as of January 1			
Cohabitant and living with partner	3.16 (1.47-6.79)	2.63 (1.43-4.87)	2.54 (1.37-4.72)
Widow or widower and living alone	42.25 (3.97-449.30)	3.18 (0.95-10.63)	2.59 (0.76-8.89)
Divorced and living alone	15.32 (7.43-31.59)	2.07 (1.21-3.53)	1.86 (1.07-3.21)
Separated (ie, married and living alone)	3.04 (1.71-5.40)	1.09 (0.66-1.78)	1.05 (0.63-1.74)
Never legally married and living alone	2.67 (1.15-6.24)	2.53 (1.29-4.97)	2.52 (1.27-5.00)

<sup>a</sup>Data are given as hazard ratio for suicide (95% confidence interval). The reference for gross income is highest quartile; for labor market affiliation, fully employed; and for marital status as of January 1, married and living with spouse.

<sup>b</sup>In each analysis, individuals who are not living in Denmark constitute a separate category.

<sup>c</sup>Adjusted for individual factors by stratification (eg, genetic predisposition and circumstances during upbringing).

<sup>d</sup>In addition, adjusted for each factor's expected trend over psychiatric admissions.

<sup>e</sup>In addition, adjusted for length of latest admission (1-7, 8-14, 15-30, 31-90, 91-182, 183-365, and >365 days) with the following hazard ratios (95% confidence intervals) in the fully adjusted analysis: 1.00, 1.02 (0.76-1.37), 0.89 (0.68-1.17), 0.56 (0.43-0.74), 0.76 (0.53-1.09), 0.68 (0.38-1.21), and 0.27 (0.08-0.95), respectively. Gross income is adjusted for labor market affiliation and marital status. Labor market affiliation and marital status are mutually adjusted.

income, employment, or marriage are in fact at increased risk of suicide. Furthermore, illness awareness and fear of mental disintegration are suggested to be associated with suicide risk.<sup>45</sup> Although there are no private psychiatric hospitals, and hospital treatment is free of charge in Denmark, the results might be confounded by illness severity or other preceding psychiatric problems,<sup>46</sup> because less severe illness in high-income groups may be treated in private psychiatric consultations. When hospital beds are in short supply, perhaps a single and disadvantaged patient is more likely admitted than an economically well-off patient who has stronger family support, even if these 2 patients show similar symptoms. Information on psychiatric diagnoses and number and length of admissions might not capture the subtle elements of illness severity, but the results presented herein show that patients in lower socioeconomic groups are more readily admitted. Mental illness might be a step on the causal pathway from social position to suicide<sup>47</sup> and, furthermore, a mediating factor could be that treatment and aftercare perhaps focus on the larger proportion of patients who are the most disadvantaged. Whatever the causal explanation, patients with a higher socioeconomic position seem to be at a higher risk of suicide.

Although this study is limited to the Danish population, there is some sparse evidence from other research. A Finnish study<sup>48</sup> implies that risk of suicide is higher among patients with a higher income (no evidence is presented); British studies<sup>19,49</sup> find a nonsignificant 10% and 30% reduced suicide risk in unemployed patients; a US study<sup>50</sup> based on 8 cases of suicide and undetermined cause of death in 43 deaths finds that the most educated patients have the greatest increased risk of unnatural death; a Finnish study<sup>17</sup> based on 10 suicides among 149 patients with psychosis

suggests that good school performance is associated with an increased risk of suicide; and data from a British study<sup>51</sup> suggest a Mantel-Haenszel odds ratio<sup>32</sup> in the range between 7.0 and 1.2 for married patients (not reported directly, but the researchers note that 35 patients are married among 149 who die by suicide and 29 patients are unmarried among 149 individually matched controls). Although these studies are small and perhaps based on selected patient groups, the findings are in keeping with ours.

The present study is limited by only using observational data from routine registers, and although this minimizes differential misclassification, unregistered loss of income and job and recent marital breakup might in principle explain the observed patterns of risk. However, such unobserved events cannot explain the reversed association between educational attainment and suicide risk because an acquired education is permanently kept.

Redressing the stigmatization of mental illness is a major target of suicide prevention,<sup>12,52</sup> but it is not evident from the literature that patients who have managed well earlier in life are particularly prone to face stigma. This study suggests that these patients and patients who experience a faster downward social drift than their peers might constitute a target for suicide prevention. Evidence presented herein suggests that hospital readmission prevents suicide and that the suicide risk is reduced in patients who stay in the hospital longer than during their previous admissions and who stay longer than other patients who have similar disorders.

In summary, even though suicide generally is associated with low income, unemployment, educational underachievement, and singleness, this observational study suggests that the opposite is true among former psychiatric patients. This study also suggests that loss of in-

come, labor market status, and marriage increase the patient's risk of suicide. Last, this study suggests that hospital admission and longer duration of inpatient stay might help to prevent suicides.

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