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Cross-National Prevalence and Risk Factors for Suicidal Ideation, Plans, and Attempts

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Abstract

Background—Suicide is a leading cause of death world-wide; however, the prevalence and risk factors for the immediate precursors to suicide: suicidal ideation, plans and attempts, are not well-known, especially in developing countries.

Aims—To report on the prevalence and risk factors for suicidal behaviors across 17 countries.

Method—84,850 adults were interviewed regarding suicidal behaviors and socio-demographic and psychiatric risk factors.

Results—The cross-national lifetime prevalence (standard error) of suicidal ideation, plans, and attempts is 9.2% (0.1), 3.1% (0.1), and 2.7% (0.1). Across all countries, 60% of transitions from ideation to plan and attempt occur within the first year after ideation onset. Consistent cross-national risk factors included being: female, younger, less educated, unmarried, and having a mental disorder. Interestingly, the strongest diagnostic risk factors were mood disorders in developed countries but impulse-control disorders in developing countries.

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Conclusion—Despite cross-national variability in prevalence, there is strong consistency in the characteristics of and risk factors for suicidal behaviors. These findings have significant implications for the prediction and prevention of suicidal behaviors.

Suicide is among the leading causes of death worldwide.¹ Yet, basic data on the prevalence and risk factors for suicide and its immediate precursors: suicidal ideation, plans, and attempts, are unavailable in many countries around the world, particularly those that are less developed.² Most studies of suicidal thoughts and behaviors (hereafter “suicidal behaviors”) have been conducted within individual, Western, developed countries^{3–6} and it is not known whether prevalence estimates and risk factors identified in such studies generalize beyond these countries. Recent studies in several developing countries such as China and India suggest the occurrence of suicidal behaviors may differ markedly from developed countries. For instance, this work suggests that gender and the presence of mental disorders play less of a role in the occurrence of suicidal behaviors in developing countries.^{7,8} Data on suicidal behaviors collected cross-nationally would provide a unique opportunity to evaluate the consistency of prevalence estimates and risk factors for these important outcomes, and would greatly inform research, policy, and treatment efforts more broadly aimed at understanding and preventing suicide around the world.^{1,9}

The purpose of the current study was to estimate the cross-national prevalence of suicidal behaviors and to examine risk factors for these outcomes using data from the World Health Organization (WHO) World Mental Health (WMH) Survey Initiative.¹⁰ Several studies have provided valuable information about suicidal behaviors across several countries.^{5,11,12} The current study extends prior work by conducting a more thorough examination of suicidal behaviors, using more consistent assessment methods across sites, and represents the largest, most representative examination of suicidal behaviors ever conducted.

METHOD

Respondent Samples

The WMH surveys were carried out in 17 countries in: Africa (Nigeria; South Africa); the Americas (Colombia; Mexico; United States), Asia and the Pacific (Japan; New Zealand; Beijing and Shanghai in the Peoples Republic of China), Europe (Belgium; France; Germany; Italy; the Netherlands; Spain; Ukraine);¹³ and the Middle East (Israel; Lebanon). The World Bank¹⁴ classifies China, Colombia, Lebanon, Mexico, Nigeria, South Africa, and Ukraine as less developed or developing countries; and all other survey countries as developed. All surveys were conducted face-to-face by trained lay interviewers among multi-stage household probability samples (described in Table 1). The total sample size was 84,850, with individual country sample sizes ranging from 2,372 in the Netherlands to 12,992 in New Zealand. The weighted average response rate across all countries was 71.1%.

Procedures

All respondents completed a Part I interview that contained core diagnostic assessments, including the assessment of suicidal behaviors. All Part I respondents who met criteria for any disorder and a sub-sample of approximately 25% of the rest of the respondents were administered a Part II interview that assessed potential correlates and disorders of secondary interest (n=48,427). Data were weighted to adjust for this differential sampling of Part II respondents, differential probabilities of selection within households, and to match samples to population socio-demographic distributions.

Standardized interviewer training procedures, WHO translation protocols for all study materials, and quality control procedures for interviewer and data accuracy that have been consistently employed across all WMH countries are described in more detail elsewhere¹⁰.

^{15,16}. Informed consent was obtained before beginning interviews in all countries. Procedures for obtaining informed consent and protecting human subjects were approved and monitored for compliance by the Institutional Review Boards of organizations coordinating surveys in each country.

Measures of suicidal behaviors

Suicidal ideation, plans, and attempts were assessed using Version 3.0 of the WHO Composite International Diagnostic Interview (CIDI).¹⁶ Based on evidence that reports of such potentially embarrassing behaviors are higher in self-administered than interviewer-administered surveys,¹⁷ these questions were printed in a self-administered booklet and referred to by letter (e.g., “Did experience C ever happen to you?” In booklet, “C=You attempted suicide”). In cases in which the respondent was unable to read, the interviewer read these items aloud (19.5% of all cases). Interviews assessed the lifetime presence and age-of-onset (AOO) of each outcome.

Risk factors for suicidal behaviors

Interviews also examined three sets of risk factors for suicidal behaviors: socio-demographics, characteristics of suicidal behaviors, and temporally prior DSM-IV mental disorders (i.e., those with an onset prior to the first onset of suicidal ideation). The socio-demographic factors included sex, age/cohort, education, employment history, and marital history. Characteristics of suicidal behaviors included AOO of ideation, time since onset of ideation, presence of a suicide plan, and time since onset of plan. Respondent disorders were assessed using the WHO CIDI.¹⁶ The assessment included DSM-IV mood, anxiety, impulse-control, and substance use disorders. Prior studies using clinical reappraisal interviews have found CIDI diagnoses to have good concordance with blinded diagnoses based on the Structured Clinical Interview for DSM-IV¹⁸ in probability sub-samples of respondents from the France, Italy, Spain, and US surveys.^{19,20}

Statistical analysis

Cross-tabulations were used to estimate lifetime prevalence of suicidal ideation, plans, and attempts. Discrete-time survival analysis with person-year as the unit of analysis and including both stable (e.g., gender) and time-varying (e.g., marital history) covariates²¹ was used to study retrospectively assessed risk factors for the first onset of each suicidal behavior. Discrete-time survival analysis uses each year of life of each respondent as a separate observation, so that a sample of 100,000 respondents with an average age of 30 would be treated as 3 million separate records. Each record is coded for the respondent’s stable characteristics (e.g., gender), the respondent’s age at the time of the observational record (e.g., the 20th year of life of a respondent who was age 45 at the time of interview), values on the time-varying predictors as of that year of life (e.g., whether or not the respondent was still a student, had ever been married, and had ever been employed as of age 20), and values on the outcomes as of that year (e.g., whether or not the respondent had ever made a suicide attempt and, if so, if this was the year of the respondent’s first lifetime attempt). The data file was analyzed to compare person-years for all respondents that had never had the outcome of interest versus the year of first onset of the outcome using a logistic regression modelling approach and controlling for person-year (i.e., age at the time of the observational record) as well as for the predictors. Logistic regression coefficients were converted to odd-ratios (ORs) for ease of interpretation and 95% confidence intervals (CI’s) are also reported and have been adjusted for design effects. Continuous variables were divided into categories to minimize effects of extreme values. Standard errors (SE) and significance tests were estimated using the Taylor series method²² using SUDAAN software²³ to adjust for the effects of weighting and clustering. Multivariate significance was evaluated using Wald χ^2 tests based on design-corrected coefficient variance-covariance matrices. Statistical significance was evaluated using two-tailed .05-level tests.

RESULTS

Prevalence

The estimated lifetime prevalence (SE) of suicidal ideation, plan, and attempt in the overall cross-national sample is 9.2% (0.1), 3.1% (0.1), and 2.7% (0.1), respectively (Table 2a). Among suicide ideators, the conditional probability of ever making a suicide plan is 33.6% (0.7) and of ever making a suicide attempt is 29.0% (0.6). The probability of attempt among ideators with a plan is 56.0% (1.2) but only 15.4% (0.6) among those without a plan (Table 2b).

Within-country prevalence estimates show substantial variability, with the cross-national estimate outside the 95% CI in 13 of the 17 countries for suicidal ideation, and 12 of the 17 for suicide plans and attempts. Prevalence estimates in developing countries are similar to those in developed countries for: suicidal ideation (3.1% to 12.4% versus 3.0% to 15.9%, respectively), suicide plan (0.9% to 4.1% vs. 0.7% to 5.6%, respectively), and suicide attempt (0.7% to 4.7% vs. 0.5% to 5.0%, respectively). Although prevalence estimates varied cross-nationally, the conditional probability of suicide plan and attempt among ideators is more consistent across countries, with the cross-national estimate outside the 95% CI in only 5 of the 17 countries for plans, 7 of 17 for attempts, 9 of 17 for unplanned attempts, and 4 of 17 for planned attempts.

Socio-demographic factors

In the cross-national sample, risk of each suicidal behavior is significantly related to being female, younger age, having fewer years of formal education, and before ever being married (Table 3a). The ORs of these predictors are fairly modest in magnitude (1.3–3.1) with the exception of age. Age is inversely related to risk of each suicidal behavior, with ORs increasing as age decreases across those 50–64 years (2.6–3.4), 35–49 years (4.2–5.6), and 18–34 years (9.5–12.4). Employment history is unrelated to suicidal behaviors. Notably, the relations between the socio-demographic risk factors and suicidal behaviors are attenuated when predicting suicide plans and attempts among ideators (Table 3b), suggesting the relations between these socio-demographic factors and suicide plans and attempts are due primarily to their association with suicidal ideation.

Within-country findings are very similar to those in the pooled sample. For example, a dominant sign pattern exists for female gender and risk of the three main outcomes of suicidal ideation, plan, and attempt (i.e., 47 of the 51 ORs across the 17 separate countries are 1.0 or greater) and 57% of the within-country ORs for gender are significant at the .05 level. ORs for female gender are always 1.0 or greater for suicidal ideation, and are less than 1.0 in only two instances for suicide plan (Japan=0.9, Nigeria=0.9), and two for attempt (Colombia=0.9, Nigeria=0.8), none being statistically significant. Similarly, the strong relation between age and risk of suicidal behaviors is consistent across 16 of the 17 countries (in Japan the highest risk of each outcome is in the 35–49 cohort), with 88% of the within-country ORs for the youngest cohort significant at the .05 level. Results are similar but less consistently significant in within-country analyses for education, employment, and marital history given the relatively small effect sizes for these relations.

Characteristics of suicidal behaviors as risk factors

Suicide ideators within each country were classified into terciles based on age-of-onset (AOO) of suicidal ideation to examine the relation between AOO and risk of transition from ideation to plans and attempts. Analyses revealed that earlier AOO is significantly associated with greater risk of suicide plan and attempt among those with ideation (Table 3b). Importantly, the transition from suicidal ideation to first onset of plan or attempt is extremely elevated within

the first year of onset of ideation (OR=117.4–123.1), and decreases substantially thereafter (OR=1.5–4.4). Among ideators, having a suicide plan is associated with a significantly higher risk of making an attempt (OR=7.5), although the odds of making an unplanned attempt within the first year after onset of ideation are just as high (OR=174.6) as the odds of making an attempt within the first year after onset of a plan (OR=168.4). Thus, whether a plan is present or not, the highest risk of suicide attempt is in the first year after onset of ideation.

Examination of AOO curves reveals that across all 17 countries the risk of first onset of suicidal ideation increases sharply during adolescence and young adulthood (Figure 1). These curves separate in the mid-teens to early-20's, with several countries (Japan, New Zealand, US) showing an earlier increase in risk of suicidal ideation, while other countries have a sharp increase in risk later in life (Israel, Mexico, Spain, Ukraine). Conditional AOO curves show that the rapid transitions from ideation to attempt (Figure 2) occur within the first year of onset of ideation more than 60% of the time across all 17 countries. The same pattern was observed for the transitions from ideation to plan and plan to attempt across all countries.

Mental disorders as risk factors

In the cross-national sample, the presence of a prior mental disorder is associated with significantly increased risk of suicidal behaviors, even after controlling for socio-demographic factors, characteristics of suicidal behaviors, and country of residence (see Tables 4a & 4b). Relations are strongest across both developed and developing countries for mood disorders (OR=3.4–5.9) and impulse-control disorders (3.3–6.5), followed by anxiety disorders (2.8–4.8), and substance use disorders (2.8–4.6). Importantly, associations between mental disorders and suicidal behaviors are attenuated when predicting plans and attempts among ideators, with ORs decreasing to 1.0–2.1 across all categories. Among ideators, the risk of making an attempt is highest for those with substance use and impulse-control disorders, suggesting these disorders are most strongly associated with acting on suicidal thoughts when they are present. Results also show a strong dose-response relation between the number of mental disorders present and the risk of suicidal behaviors.

In within-country analyses, the presence of any mental disorder is associated with significantly increased risk in each of the 17 countries. The ORs for these analyses are quite stable, with only three countries differing significantly from the cross-national estimate for any outcome. Specifically, Israel is above the cross-national estimate for ideation, plan, and attempt, Italy is above the estimate for attempt, and Germany is below the estimate for ideation. The strong dose-response relation between number of disorders and risk of suicidal behaviors also is consistent across all 17 countries.

Within-country analyses examining the relation between each of the four disorder categories and the three primary suicidal behaviors also are largely consistent with those in the pooled cross-national sample, with only three of 204 (1.5%) ORs less than 1.0, and 92.5% of ORs significant at the .05 level. The greatest variability among countries is in the relation between mood disorder and suicidal behaviors. Seven countries have ORs significantly higher than the cross-national estimate (Belgium, China, Germany, Israel, Italy, Japan, and Nigeria) and two below (Colombia, France).

Analyses revealed an interesting pattern regarding developing versus developed countries. In developed countries the presence of a mood disorder is the strongest predictor of suicidal ideation, plan, and attempt (see Table 4a; 9 of 10 countries show this pattern). However, in developing countries the presence of an impulse-control disorder is a stronger predictor than mood disorder (see Table 4b; 5 of the 6 countries in which impulse-control disorders were examined). Thus, although the presence of mental disorders in general, and comorbidity in

particular, are consistently strong predictors of suicidal behaviors cross-nationally, there are notable differences in the type of disorder most strongly predictive of suicidal behaviors.

DISCUSSION

The results of this study provide valuable and previously unavailable information about the prevalence and risk factors of suicidal behaviors around the world. Our results show that although there is substantial variability in the prevalence of suicidal behaviors cross-nationally, there are important cross-national consistencies in the prevalence and risk factors for suicidal behaviors. Most notably, across all countries examined, 60% of the transitions from suicidal ideation to first suicide attempt occurred within the first year of ideation onset. Moreover, consistent cross-national risk factors included: female sex, younger age, fewer years of education, unmarried status, and the presence of a mental disorder, with psychiatric comorbidity significantly increasing risk. Interestingly, the strongest diagnostic risk factors were mood disorders in developed countries, but impulse-control disorders in developing countries.

Several important limitations should be borne in mind when interpreting these results. First, although the overall response rate was at an acceptable level, response rates varied across countries and in some cases were below commonly accepted standards. We controlled for differential response using post-stratification adjustments, but it is possible that response rates were related to the presence of suicidal behaviors or mental disorders, which could have biased cross-national comparisons. Also, although surveys in most countries included nationally representative samples, several surveys (e.g., China, Japan) focused on specific urban areas and so findings from those surveys may not generalize to all regions of those countries. A related limitation is that although we examined suicidal behaviors across 17 countries, several countries/regions with high rates of suicide were not included such as India and South East Asia.²⁴ The inclusion of data from additional countries/regions in future work will significantly enhance our understanding of the factors influencing suicidal behaviors more broadly.

Second, data were based on retrospective self-report of the occurrence and timing of suicidal behaviors, and thus may be subject to under-reporting and biased recall. We also did not collect information from third-party informants to validate respondent reports. On balance, several systematic reviews have demonstrated that adults can recall past experiences with sufficient accuracy to provide valuable information,^{25,26} and such data are especially useful when prospective data are not available,²⁷ as in the current case. Another limitation is that there may be cultural differences in the willingness to report on suicidal behaviors and in the interpretation of questions about DSM-IV mental disorders. Our results must be viewed with these limitations in mind.

Third, several mental disorders were not adequately assessed in the WMH surveys for various reasons. A few DSM-IV disorders were not assessed in some surveys because they were believed to have low relevance or they were excluded from analyses due to an insufficient number of cases, such as impulse-control disorders in Nigeria; and in some cases disorders were not adequately assessed due to skip logic errors, such as bipolar disorder and substance use disorders in the ESEMeD Surveys.¹⁰ Schizophrenia and other nonaffective psychoses were not included in any WMH survey because previous validation studies showed they are overestimated in lay-administered interviews like the CIDI.²⁸ These exclusions are unfortunate because prior research clearly indicates that bipolar and substance use disorders are strongly associated with suicidal behaviors^{3,6} and suggests that schizophrenia and suicidal behaviors share unique prevalence patterns and are strongly related in developing countries,²⁹ thus the current study might have provided important information in this regard. The

measurement of these disorders and the explanation of their relation to suicidal behaviors in both developed and developing countries is one of the most important tasks for future work on this topic.

Fourth, this initial study included only a limited range of risk factors for suicidal behavior. Factors such as individual axis I and axis II disorders and traumatic life events were not examined in this study. Also excluded were potential protective factors such as treatment utilization and social support. The investigation of these and other factors remain important directions for future research.

These limitations notwithstanding, several important findings from this study warrant more detailed comment. Perhaps the most important finding of this study is that there is strong cross-national consistency for several key risk factors for suicidal behaviors. Female gender, young age, and low educational attainment have been identified as risk factors for suicidal behaviors in prior studies,^{3,6} and the current findings suggest these risk factors may be universal. Future research is needed to determine whether risk of suicidal behaviors is occurring at higher rates among young people, or whether people simply become less likely to report on earlier suicidal behavior with age, due to forgetting or re-interpretation of these earlier events.

Risk of suicide plans and attempts also was highest when suicidal ideation had an earlier AOO and within the first year of ideation. Remarkably, 60% of the transitions from ideation to attempt—as well as from ideation to plan and plan to attempt—occur within the first year of onset of ideation and this result is consistent across all 17 countries. Few studies have examined the probability and speed of transition from ideation to plans and attempts, and this information can be especially useful to health care providers. Another important finding is that the strong relation observed between mental disorders and suicide plans and attempts diminishes when controlling for ideation. Thus, although mental disorders are strong risk factors of suicidal behaviors, factors beyond the mere presence of mental disorders explain the transition from ideation to plans and attempts.

Several recent studies have suggested that mental disorders are less important in the occurrence of suicidal behaviors in developing countries relative to developed countries. Whereas studies in developed countries suggest >90% of those who die by suicide have a diagnosable mental disorder and >60% have a mood disorder in particular,³⁰ rates in developing countries have been suggested to be as low as 60% and 35%, respectively.⁷ Our results indicate that when the same assessment methods are used cross-nationally, mental disorders are as predictive of suicidal behaviors in developing countries as they are in developed countries, and that comorbidity is an important predictor across all countries. Notably though, impulse-control disorders were stronger predictors than mood disorders in most developing countries. The fact that mood and impulse control disorders have the strongest associations with suicidal behaviors is consistent with prior work highlighting the importance of depressed mood and impulsiveness in the suicidal process,³¹ and extends these findings cross-nationally. The reason for the difference in the importance of impulse-control disorders between developed and developing countries is unclear and awaits further examination.

Future research must examine factors that might explain the variability in prevalence and also must develop more complex risk and protective models that take into account both common and specific factors for each country/region. From a practical perspective, the similarities observed between developing and developed countries suggest equivalent resources should be devoted to studying and preventing suicidal behaviors in these countries. Currently, however, resources devoted to the treatment of mental disorders in general, and to suicide prevention in particular,⁹ are lacking in many developing (and developed) countries.^{7,10} It is important to note, however, that more treatment alone is not the answer. Several recent studies have

highlighted that despite significant increases in service utilization among suicidal individuals, the rates of suicidal ideation, plans, and attempts have remained virtually unchanged.⁴ Moreover, although several different forms of treatment have proven effective at decreasing the likelihood of making suicide attempts, psychosocial treatments have proven less effective at decreasing the likelihood of suicide death.³² Improvements in our ability to predict and prevent suicidal behaviors and suicide deaths are clearly needed and require that we continue to identify the risk and protective factors that influence such behaviors and also that we develop more sophisticated methods for synthesizing and using the information obtained about such factors.

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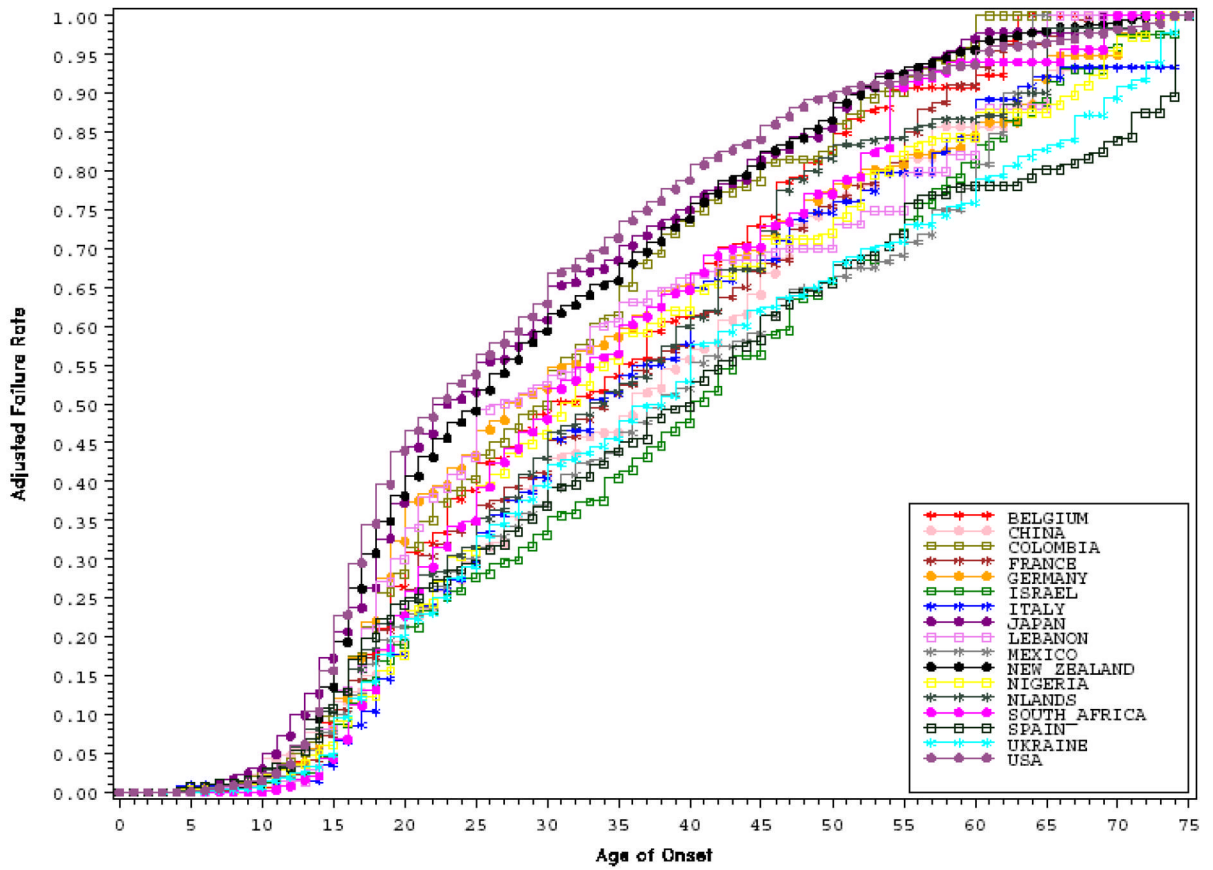


Figure 1.
Cumulative Age-of-Onset Distribution for Suicide Ideation in each Country

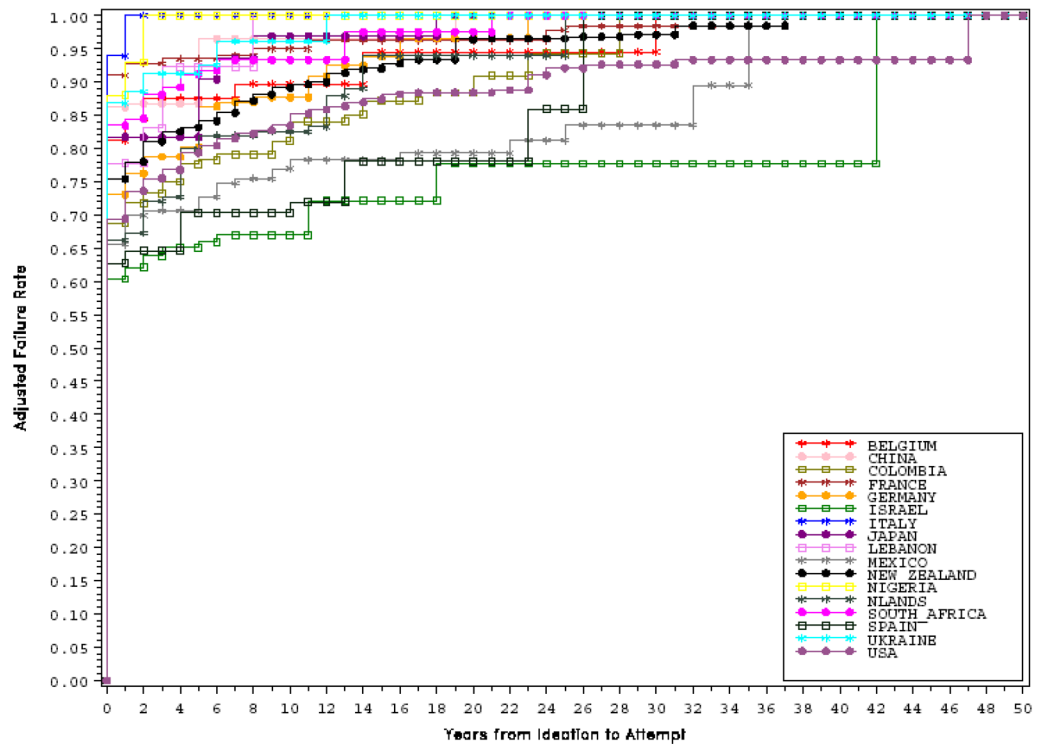


Figure 2. Conditional, Cumulative Speed of Transition from Ideation to Attempt in each Country

Table 1

Sample Characteristics

Country	Survey ¹	Sample Characteristics ²	Field Dates	Age Range	Sample Size		Response Rate	
					Part I	Part II		
Belgium	ESEMeD	Stratified multistage clustered probability sample of individuals residing in households from the national register of Belgium residents. NR	2001–2	18+	2419	1043	486	50.6
Colombia	NSMH	Stratified multistage clustered area probability sample of household residents in all urban areas of the country (approximately 73% of the total national population)	2003	18–65	4426	2381	1731	87.7
France	ESEMeD	Stratified multistage clustered sample of working telephone numbers merged with a reverse directory (for listed numbers). Initial recruitment was by telephone, with supplemental in-person recruitment in households with listed numbers. NR	2001–2	18+	2894	1436	727	45.9
Germany	ESEMeD	Stratified multistage clustered probability sample of individuals from community resident registries. NR	2002–3	18+	3555	1323	621	57.8
Italy	ESEMeD	Stratified multistage clustered probability sample of individuals from municipality resident registries. NR	2001–2	18+	4712	1779	853	71.3
Israel	NHS	Stratified multistage clustered area probability sample from national register of Israeli residents. NR	2002–4	21+	4859	--	--	72.6
Japan	WMHI2002-2003	Un-clustered two-stage probability sample of individuals residing in households in four metropolitan areas (Fukui, Kushikino, Nagasaki, Okayama)	2002–3	20+	2436	887	282	56.4
Lebanon	LEBANON	Stratified multistage clustered area probability sample of household residents. NR	2002–3	18+	2857	1031	595	70.0
Mexico	M-NCS	Stratified multistage clustered area probability sample of household residents in all urban areas of the country (approximately 75% of the total national population)	2001–2	18–65	5782	2362	1736	76.6
Netherlands	ESEMeD	Stratified multistage clustered probability sample of individuals residing in households that are listed in municipal postal registries. NR	2002–3	18+	2372	1094	516	56.4
New Zealand	NZMHS	Stratified multistage clustered area probability sample of household residents. NR	2004–5	16+	12992	7435	4242	73.3
Nigeria	NSMHW	Stratified multistage clustered area probability sample of households in 21 of the 36 states in the country, representing 57% of the national population. The surveys were conducted in Yoruba, Igbo, Hausa and Efik languages.	2002–3	18+	6752	2143	1203	79.3

Country	Survey ¹	Sample Characteristics ²	Field Dates	Age Range	Sample Size		Response Rate	
					Part I	Part II		
PRC Beijing ⁵	B-WMH	Stratified multistage clustered area probability sample of household residents in the Beijing metropolitan area.	2002–3	18+	2633	914	307	74.8
PRC Shanghai ⁵	S-WMH	Stratified multistage clustered area probability sample of household residents in the Shanghai metropolitan area.	2002–3	18+	2568	714	263	74.6
South Africa	SASH	Stratified multistage clustered area probability sample of household residents.	2003–4	18+	4315	--	--	87.1
Spain	ESEMeD	Stratified multistage clustered area probability sample of household residents.	2001–2	18+	5473	2121	960	78.6
Ukraine	CMDPSD	Stratified multistage clustered area probability sample of household residents.	2002	18+	4725	1720	541	78.3
United States	NCS-R	Stratified multistage clustered area probability sample of household residents.	2002–3	18+	9282	5692	3197	70.9

¹ ESEMeD (The European Study Of The Epidemiology Of Mental Disorders); NSMH (The Colombian National Study of Mental Health); NHS (Israel National Health Survey); WMHJ2002-2003 (World Mental Health Japan Survey); LEBANON (Lebanese Evaluation of the Burden of Ailments and Needs of the Nation); M-NCS (The Mexico National Comorbidity Survey); NZMHS (New Zealand Mental Health Survey); NSMHW (The Nigerian Survey of Mental Health and Wellbeing); B-WMH (The Beijing World Mental Health survey); S-WMH (The Shanghai World Mental Health Survey); SASH (South Africa Health Survey); CMDPSD (Comorbid Mental Disorders during Periods of Social Disruption); NCS-R (The US National Comorbidity Survey Replication).

² Most WMH surveys are based on stratified multistage clustered area probability household samples in which samples of areas equivalent to counties or municipalities in the US were selected in the first stage followed by one or more subsequent stages of geographic sampling (e.g., towns within counties, blocks within towns, households within blocks) to arrive at a sample of households, in each of which a listing of household members was created and one or two people were selected from this listing to be interviewed. No substitution was allowed when the originally sampled household resident could not be interviewed. These household samples were selected from Census area data in all countries other than France (where telephone directories were used to select households) and the Netherlands (where postal registries were used to select households). Several WMH surveys (Belgium, Germany, Italy) used municipal resident registries to select respondents without listing households. The Japanese sample is the only totally un-clustered sample, with households randomly selected in each of the four sample areas and one random respondent selected in each sample household. Nine of the 15 surveys are based on nationally representative (NR) household samples, while two others are based on nationally representative household samples in urbanized areas (Colombia, Mexico).

³ The response rate is calculated as the ratio of the number of households in which an interview was completed to the number of households originally sampled, excluding from the denominator households known not to be eligible either because of being vacant at the time of initial contact or because the residents were unable to speak the designated languages of the survey.

⁴ All countries, with the exception of Nigeria, PRC Beijing, PRC Shanghai, and Ukraine (which were age restricted to ≤ 39) were age restricted to ≤ 44 .

⁵ People's Republic of China

Table 2
 Table 2a. Lifetime Prevalence of Suicide-Related Outcomes in the WMH Surveys
 Table 2b. Lifetime Prevalence of Suicide-Related Outcomes in the WMH Surveys

	Total Sample											
	Ideation				Plan				Attempt			
	%	(se)	(sd)	(n)	%	(se)	(sd)	(n)	%	(se)	(sd)	(n)
The Americas												
Colombia	12.4**	(0.7)	(46.6)	(587)	4.1**	(0.4)	(26.6)	(204)	4.7**	(0.4)	(26.6)	(224)
Mexico	8.1*	(0.5)	(38.0)	(488)	3.2	(0.3)	(22.8)	(192)	2.7	(0.3)	(22.8)	(166)
USA	15.6***	(0.5)	(48.2)	(1462)	5.4***	(0.3)	(28.9)	(507)	5.0***	(0.2)	(19.3)	(469)
Europe												
Belgium	8.4	(0.9)	(44.3)	(209)	2.7	(0.4)	(19.7)	(77)	2.5	(0.4)	(19.7)	(66)
France	12.4***	(0.7)	(37.7)	(391)	4.4**	(0.4)	(21.5)	(143)	3.4	(0.4)	(21.5)	(115)
Germany	9.7	(0.7)	(41.7)	(347)	2.2*	(0.3)	(17.9)	(78)	1.7*	(0.3)	(17.9)	(64)
Italy	3.0*	(0.3)	(20.6)	(144)	0.7*	(0.1)	(6.9)	(33)	0.5*	(0.1)	(6.9)	(26)
Netherlands	8.2	(0.6)	(29.2)	(223)	2.7	(0.5)	(24.4)	(78)	2.3	(0.3)	(14.6)	(64)
Spain	4.4*	(0.3)	(22.2)	(272)	1.4*	(0.2)	(14.8)	(84)	1.5*	(0.2)	(14.8)	(80)
Ukraine	8.2*	(0.5)	(34.4)	(389)	2.7	(0.3)	(20.6)	(126)	1.8*	(0.2)	(13.7)	(80)
Africa & the Middle East												
Israel	5.5	(0.3)	(20.9)	(268)	1.9*	(0.2)	(13.9)	(93)	1.4*	(0.2)	(13.9)	(66)
Lebanon	4.3*	(0.6)	(32.1)	(117)	1.7*	(0.4)	(21.4)	(39)	2.0*	(0.3)	(16.0)	(54)
Nigeria	3.2*	(0.2)	(16.4)	(237)	1.0*	(0.1)	(8.2)	(70)	0.7*	(0.1)	(8.2)	(46)
South Africa	9.1	(0.7)	(46.0)	(394)	3.8	(0.4)	(26.3)	(171)	2.9	(0.3)	(19.7)	(140)
Asia and the Pacific												
China	3.1*	(0.2)	(14.4)	(160)	0.9*	(0.2)	(14.4)	(42)	1.0*	(0.2)	(14.4)	(49)
Japan	10.9***	(0.5)	(24.7)	(264)	2.1*	(0.3)	(14.8)	(50)	1.9*	(0.3)	(14.8)	(48)
New Zealand	15.9***	(0.5)	(56.5)	(2212)	5.6***	(0.3)	(33.9)	(814)	4.6***	(0.3)	(33.9)	(688)
Total	9.2	(0.1)	(29.1)	(8164)	3.1	(0.1)	(29.1)	(2801)	2.7	(0.1)	(29.1)	(2445)
Among Ideators												
	Plan				Attempt				Attempt with a lifetime plan			
	%	(se)	(sd)	(n)	%	(se)	(sd)	(n)	%	(se)	(sd)	(n)
The Americas												
Colombia	33.2	(2.6)	(63.0)	(204)	37.8**	(2.6)	(63.0)	(224)	22.7**	(3.2)	(62.6)	(77)
Mexico	39.0***	(2.7)	(59.6)	(192)	33.8	(2.7)	(59.6)	(166)	16.3	(2.6)	(44.7)	(48)
USA	34.5	(1.6)	(61.2)	(507)	31.8	(1.4)	(53.5)	(469)	19.9***	(1.4)	(43.3)	(185)
Europe												
Belgium	32.2	(3.4)	(49.2)	(77)	29.4	(4.3)	(62.2)	(66)	12.2	(3.4)	(39.1)	(16)
France	35.9	(3.1)	(61.3)	(143)	27.2	(2.9)	(57.3)	(115)	14.2	(3.1)	(48.8)	(40)
Germany	22.1*	(2.5)	(46.6)	(78)	17.4*	(2.2)	(41.0)	(64)	4.0*	(1.3)	(21.3)	(14)
Italy	24.6*	(4.0)	(48.0)	(33)	18.2*	(4.5)	(54.0)	(26)	8.2*	(3.0)	(31.6)	(10)
Netherlands	33.4	(4.6)	(68.7)	(78)	27.6	(3.5)	(52.3)	(64)	12.0	(3.2)	(38.5)	(18)
Spain	33.1	(3.8)	(62.7)	(84)	33.9	(3.1)	(51.1)	(80)	14.4	(3.4)	(46.6)	(23)
Ukraine	32.9	(2.5)	(49.3)	(126)	21.5*	(2.7)	(53.3)	(80)	13.4	(2.3)	(37.3)	(32)
Africa & the Middle East												
Israel												
Lebanon												
Nigeria												
South Africa												
China												
Japan												
New Zealand												
Total												
Colombia	68.3**	(3.5)	(50.0)	(147)	68.3**	(3.5)	(50.0)	(147)	68.3**	(3.5)	(50.0)	(147)
Mexico	66.5	(4.8)	(66.5)	(118)	61.3	(4.8)	(66.5)	(118)	61.3	(4.8)	(66.5)	(118)
USA	69.8	(3.1)	(69.8)	(284)	54.4	(3.1)	(69.8)	(284)	54.4	(3.1)	(69.8)	(284)
Belgium	65.7	(7.0)	(61.4)	(50)	65.7	(7.0)	(61.4)	(50)	65.7	(7.0)	(61.4)	(50)
France	50.4	(4.6)	(55.0)	(75)	50.4	(4.6)	(55.0)	(75)	50.4	(4.6)	(55.0)	(75)
Germany	51.2	(5.8)	(51.2)	(50)	64.7	(5.8)	(51.2)	(50)	64.7	(5.8)	(51.2)	(50)
Italy	64.3	(11.2)	(64.3)	(16)	48.8	(11.2)	(64.3)	(16)	48.8	(11.2)	(64.3)	(16)
Netherlands	65.4	(7.4)	(65.4)	(46)	58.6	(7.4)	(65.4)	(46)	58.6	(7.4)	(65.4)	(46)
Spain	53.2	(5.8)	(53.2)	(57)	73.3**	(5.8)	(53.2)	(57)	73.3**	(5.8)	(53.2)	(57)
Ukraine	56.1	(5.0)	(56.1)	(48)	38.2*	(5.0)	(56.1)	(48)	38.2*	(5.0)	(56.1)	(48)

Total Sample																
	Ideation				Plan				Attempt							
	%	(se)	(sd)	(n)	%	(se)	(sd)	(n)	%	(se)	(sd)	(n)	(n)			
Israel	35.3	(3.2)	(52.4)	(93)	25.0	(2.9)	(47.5)	(66)	8.3*	(2.1)	(27.8)	(15)	55.5	(5.5)	(53.0)	(51)
Lebanon	38.4	(5.0)	(54.1)	(39)	46.4**	(5.2)	(56.2)	(54)	30.1***	(6.3)	(55.6)	(25)	72.4**	(6.9)	(43.1)	(29)
Nigeria	30.1	(3.6)	(55.4)	(70)	20.9*	(3.0)	(46.2)	(46)	1.9*	(0.9)	(11.6)	(3)	64.8	(7.2)	(60.2)	(43)
South Africa	41.7**	(2.3)	(45.7)	(171)	31.7	(2.6)	(51.6)	(140)	11.2	(2.3)	(34.3)	(33)	60.5	(4.5)	(58.8)	(107)
Asia and the Pacific																
China	29.5	(4.6)	(58.2)	(42)	32.3	(4.9)	(62.0)	(49)	26.1**	(4.7)	(51.1)	(28)	47.1	(10.0)	(64.8)	(21)
Japan	18.8*	(2.6)	(42.2)	(50)	17.0*	(2.5)	(40.6)	(48)	8.8*	(2.1)	(30.7)	(21)	52.1	(7.0)	(49.5)	(27)
New Zealand	35.1	(1.4)	(65.8)	(814)	28.8	(1.3)	(61.1)	(688)	16.6	(1.4)	(52.3)	(241)	51.2	(2.2)	(62.8)	(447)
Total	33.6	(0.7)	(63.2)	(2801)	29.0	(0.6)	(54.2)	(2445)	15.4	(0.6)	(43.9)	(829)	56.0	(1.2)	(63.5)	(1616)

*I*_n = 84,850

* The upper end of the 95% confidence interval of the estimate is below the prevalence estimate for the total sample.

** The lower end of the 95% confidence interval of the estimate is above the prevalence estimate for the total sample.

Table 3
 Table 3a. Sociodemographic risk factors for 1st onset of suicide-related outcomes: Pooled Analysis^{1,2}
 Table 3b. Sociodemographic risk factors for 1st onset of suicide-related outcomes: Pooled Analysis¹

Socio-Demographic	Total Sample (n=48427)					
	OR	Ideation (95% CI)	OR	Plan (95% CI)	OR	Attempt (95% CI)
Gender						
Female	1.4**	(1.3-1.4)	1.4**	(1.3-1.6)	1.7**	(1.5-1.9)
X ² ₁ [p]	83.0	[0.000]	41.8	[0.000]	75.7	[0.000]
Age/Cohort³						
18-34	9.5*	(8.1-11.0)	10.3*	(8.0-13.3)	12.4*	(9.1-16.8)
35-49	4.2*	(3.7-4.9)	4.3*	(3.4-5.6)	5.6*	(4.1-7.5)
50-64	2.6**	(2.2-3.0)	2.7**	(2.1-3.4)	3.4**	(2.4-4.7)
X ² ₃ [p]	1139.6	[0.000]	454.5	[0.000]	417.0	[0.000]
Education⁴						
Student	2.6*	(2.2-3.0)	2.5*	(1.9-3.3)	2.6*	(2.0-3.4)
Low	2.0*	(1.8-2.3)	2.0*	(1.7-2.5)	3.1*	(2.5-3.9)
Low/Medium	1.3*	(1.2-1.5)	1.4*	(1.2-1.7)	1.8*	(1.4-2.3)
Medium	1.4**	(1.2-1.6)	1.5**	(1.2-1.8)	1.7**	(1.4-2.1)
X ² ₄ [p]	233.4	[0.000]	67.9	[0.000]	119.1	[0.000]
Ever employed						
No	0.9	(0.8-1.0)	0.9	(0.7-1.1)	0.9	(0.7-1.1)
X ² ₁ [p]	2.7	[0.103]	1.6	[0.209]	2.0	[0.157]
Ever married						
No	1.3*	(1.2-1.5)	1.3**	(1.1-1.5)	1.4**	(1.2-1.7)
X ² ₁ [p]	40.0	[0.000]	14.2	[0.000]	17.9	[0.000]
Among Ideators						
Socio-Demographic	Plan (n=6872) ²			Attempt w/o a lifetime plan (n=4239)		
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Gender						
Female	1.1	(1.0-1.3)	1.3**	(1.1-1.5)	1.4**	(1.0-1.6)
X ² ₁ [p]	2.1	[0.143]	12.6	[0.000]	8.0	[0.021]
Age/Cohort⁴						
18-34	1.4*	(1.0-1.9)	1.8*	(1.2-2.7)	2.0*	(1.1-3.6)
35-49	1.2	(0.9-1.7)	1.8*	(1.3-2.7)	2.1*	(1.2-3.7)
50-64	1.2	(0.9-1.5)	1.6**	(1.1-2.3)	1.8*	(1.0-3.2)
X ² ₃ [p]	4.5	[0.214]	11.3	[0.010]	7.6	[0.056]
Education⁵						
Student	1.0	(0.8-1.3)	1.1	(0.8-1.5)	1.1	(0.7-1.8)
Low	1.0	(0.8-1.3)	1.9*	(1.4-2.5)	2.2*	(1.1-2.4)
Low/Medium	1.1	(0.9-1.4)	1.4*	(1.1-1.9)	1.6*	(0.9-1.7)
Medium	1.1	(0.9-1.4)	1.3	(1.0-1.7)	1.6	(0.8-1.5)
X ² ₄ [p]	1.9	[0.753]	29.5	[0.000]	24.5	[0.028]
Ever employed						
No	1.0	(0.8-1.2)	0.9	(0.8-1.1)	0.9	(0.8-1.4)

Total Sample (n=48427)

Socio-Demographic	Ideation		Plan		Attempt	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
X^2_1 [p]	0.2	[0.696]	0.6	[0.437]	1.0	[0.325]
Ever married						
No	1.0	(0.9 – 1.2)	1.2	(1.0 – 1.5)	1.0	(0.7 – 1.3)
X^2_1 [p]	0.0	[0.909]	2.9	[0.091]	0.0	[0.159]
Age of onset of ideation⁶						
Early	1.3*	(1.0 – 1.6)	2.2*	(1.7 – 2.9)	2.9*	(1.9 – 4.4)
Middle	1.2*	(1.0 – 1.5)	1.5**	(1.2 – 1.9)	1.6**	(1.1 – 2.2)
X^2_2 [p]	5.0	[0.083]	32.2	[0.000]	27.3	[0.000]
Years since onset of ideation⁷						
0	117.4*	(87.9 – 156.8)	123.1*	(92.9 – 162.9)	174.6*	(100.9 – 302.1)
1–5	3.3*	(2.4 – 4.5)	4.4*	(3.2 – 5.9)	6.2*	(3.4 – 11.2)
6–10	1.8*	(1.2 – 2.6)	1.5	(1.0 – 2.1)	1.5	(0.6 – 3.4)
X^2_3 [p]	2207.2	[0.000]	2521.0	[0.000]	873.6	[0.000]
Have a plan						
Yes	--	--	7.5*	(6.4 – 8.7)	--	--
X^2_1 [p]	--	--	650.2	[0.000]	--	--
Years since onset of plan⁷						
0	--	--	--	--	--	168.4*
1–5	--	--	--	--	--	(106.6 – 266.1)
6–10	--	--	--	--	--	5.0*
X^2_3 [p]	--	--	--	--	--	(3.1 – 8.0)
	--	--	--	--	--	1.6
	--	--	--	--	--	(0.9 – 3.0)
	--	--	--	--	--	1126.1
	--	--	--	--	--	[0.000]

** Significant at the 0.05 level, 2-sided test

¹ Results are based on multivariate discrete-time survival models with person-year as the unit of analysis; see the text for a description.

² Each model controls for person-year

³ Referent category: 65+

⁴ Referent category: High education

** Significant at the 0.05 level, 2-sided test

-- indicates that the variable is not used as a predictor in the model

¹ Results are based on multivariate discrete-time survival models with person-year as the unit of analysis; see the text for a description.

² model controls for years since onset of ideation

³ model controls for years since onset of plan

⁴ Referent category: 65+

⁵ Referent category: High education

⁶ Referent category: Late

⁷ Referent category: 11+ years

Table 4
 Table 4a. DSM-IV Disorders as risk factors for 1st onset of suicide-related outcomes in the developed countries: Pooled Analysis
 Table 4b. DSM-IV Disorders as risk factors for 1st onset of suicide-related outcomes in the developing countries: Pooled Analysis

Disorder category	Total Sample (n=32,921)													
	Ideaation					Attempt								
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)				
Any anxiety disorders ¹	3.4*	(3.2-3.7)	4.5*	(3.9-5.1)	4.8*	(4.1-5.5)	1.6*	(1.3-1.8)	1.5*	(1.3-1.8)	1.3*	(1.0-1.7)	1.6*	(1.2-2.0)
Any mood disorders, ^{1,3}	4.7*	(4.2-5.2)	5.8*	(4.9-6.9)	5.9*	(5.0-7.1)	1.5*	(1.3-1.8)	1.3*	(1.1-1.6)	1.3	(0.9-1.7)	1.2	(0.9-1.5)
Any impulse-control disorders ²	3.3*	(2.8-3.8)	3.6*	(2.8-4.6)	4.2*	(3.3-5.4)	1.4*	(1.0-1.9)	1.5*	(1.1-2.1)	1.5*	(1.0-2.3)	1.5*	(1.0-2.2)
Any substance use disorders ^{1,3}	2.8*	(2.5-3.2)	4.1*	(3.4-4.9)	4.2*	(3.5-5.1)	1.9*	(1.6-2.4)	1.6*	(1.2-2.1)	1.9*	(1.3-2.7)	1.4	(1.0-1.9)
Any disorders ¹	4.1*	(3.8-4.5)	5.8*	(5.0-6.8)	6.4*	(5.4-7.6)	1.6*	(1.4-1.9)	1.6*	(1.3-1.9)	1.5*	(1.1-1.9)	1.6*	(1.2-2.1)
Exactly 1 disorder ¹	1.0	(0.9-1.1)	0.9	(0.7-1.1)	0.8	(0.7-1.1)	0.8	(0.6-1.0)	0.8	(0.6-1.1)	0.7	(0.4-1.1)	0.9	(0.6-1.3)
Exactly 2 disorders ¹	2.1*	(1.9-2.4)	1.9*	(1.5-2.2)	1.9*	(1.5-2.3)	0.9	(0.7-1.1)	1.0	(0.7-1.3)	1.2	(0.8-1.8)	0.8	(0.6-1.2)
3+ disorders ¹	6.1*	(5.6-6.6)	8.6*	(7.4-10.0)	8.9*	(7.7-10.3)	2.0*	(1.7-2.4)	1.8*	(1.5-2.1)	1.7*	(1.3-2.1)	1.8*	(1.4-2.3)

Disorder category	Total Sample (n=15,506)													
	Ideaation					Attempt								
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)				
Any anxiety disorders ¹	2.8*	(2.4-3.2)	3.6*	(2.8-4.5)	3.5*	(2.8-4.3)	1.5*	(1.2-1.9)	1.2	(0.9-1.5)	1.1	(0.7-1.6)	1.3	(0.9-1.8)
Any mood disorders ¹	3.4*	(2.8-4.1)	5.5*	(4.4-6.9)	4.7*	(3.6-6.0)	2.1*	(1.6-2.9)	1.0	(0.8-1.4)	0.8	(0.5-1.3)	1.2	(0.8-1.9)
Any impulse-control disorders ²	4.4*	(3.5-5.5)	6.5*	(4.8-8.8)	6.3*	(4.6-8.5)	2.1*	(1.5-2.9)	1.6*	(1.1-2.4)	1.4	(0.8-2.6)	2.3*	(1.3-4.2)
Any substance use disorders ¹	2.9*	(2.3-3.7)	4.2*	(3.0-5.9)	4.6*	(3.5-6.3)	1.8*	(1.1-2.8)	1.4*	(1.0-2.0)	1.2	(0.6-2.5)	1.6	(1.0-2.5)
Any disorders ¹	3.6*	(3.1-4.1)	5.4*	(4.4-6.7)	5.3*	(4.2-6.6)	1.8*	(1.4-2.4)	1.4*	(1.1-1.7)	1.2	(0.8-1.7)	1.6*	(1.1-2.3)
Exactly 1 disorder ¹	1.4*	(1.1-1.7)	1.0	(0.8-1.3)	1.2	(0.9-1.6)	0.7*	(0.5-1.0)	0.9	(0.7-1.3)	0.9	(0.5-1.6)	1.0	(0.6-1.6)
Exactly 2 disorders ¹	2.8*	(2.3-3.5)	3.7*	(2.9-4.7)	3.1*	(2.4-4.1)	1.5*	(1.1-2.1)	1.1	(0.8-1.6)	0.9	(0.5-1.5)	1.0	(0.6-1.7)
3+ disorders ¹	5.9*	(4.9-7.2)	10.0*	(7.7-12.9)	9.2*	(7.4-11.6)	2.5*	(1.9-3.3)	1.5*	(1.1-2.1)	1.6*	(1.0-2.6)	1.8*	(1.2-2.7)

* OR significant at the 0.05 level, 2-sided test

¹ Assessed in the Part II sample

² Assessed only in the Part II sample with age range 18-44

³ New Zealand assessed in the Part I sample

Results are based on multivariate discrete-time survival model

Each model controls for person-year, countries and the sociodemographic variables from the table 2

Developed countries include: United States, Belgium, France, Germany, Italy, Netherlands, Spain, Israel, Japan and New Zealand

Developing countries include: Colombia, Mexico, Ukraine, Lebanon, Nigeria, South Africa and People's Republic of China

Any mood disorder = major depressive, dysthymic, and bipolar disorders; Any impulse-control disorder = intermittent explosive, attention-deficit/hyperactivity, conduct, and oppositional defiant disorders; Any anxiety disorder = panic, agoraphobia, generalized anxiety, specific phobia, social phobia, post-traumatic stress, and adult separation anxiety disorders; Any substance use disorder = alcohol abuse or dependence and illicit drug abuse or dependence.