

Supplemental Online Content

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This supplemental material has been provided by the authors to give readers additional information about their work.

eAppendix. Supplemental Methods

Database

The “School Basic Survey” (SBS) is conducted by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) with the purpose of investigating fundamental aspects related to schools and obtaining foundational data for educational administration. SBS targets various educational institutions nationwide, including kindergartens, elementary schools, middle schools, high schools, special support school, universities and vocational schools. The main content of the survey includes the number of schools, enrolled students and graduates as of May 1st each year ¹.

The Japanese government publishes two suicide statistic databases, the "Vital Statistics Registration" (VSR) of the Ministry of Health, Labor, and Welfare (MHLW) and “Suicide Statistics” (SSNPA) collected by the National Police Agency (NPA)²⁻⁵.

VSR is a database of cause-of-death statistics in which suicide, homicide, accidental and unexplained deaths are recorded according to International Classification of Diseases (ICD) code. In Japan, only medical doctors can prepare death certificates, and the Medical Practitioners Law stipulates that abnormal death must be reported to the NPA within 24 hours^{4,5}.

SSNPA provides the amount values (national suicide numbers in Japan) of annual suicide numbers in each region under the jurisdiction of local police stations. The NPA must conduct physiological examinations of all corpses with abnormal causes of death to determine the cause of death³⁻⁵. The police must investigate the personal characteristics and background factors of each suicide case. Since it is impossible to collect suicide motives from the victims themselves, to eliminate subjectivity as much as possible, the police investigate suicide motives based on evidence, suicide notes, official documentation (e.g. medical certificates and clinical recordings) and testimony from the victim's family^{3,5}.

The results of this investigation discuss the different motives for suicide, and these motives are compared to previously compiled lists of motives for suicide (52 subcategories in SSNPA). The majority of suicides have diverse causes, backgrounds and complications, and occur with interactions among various factors. Therefore, the SSNPA is permitted to count multiple probable causes/motives per a suicide.

The numbers of suicides among middle-school, high-school or university students were counted according to the numbers of individuals who completed suicide when they were enrolled in middle-school, high-school or university^{2,3,5-8}.

The SSNPA published the annual suicide numbers disaggregated by 52 suicidal motives and sex (males and females) of students in middle-school (age: 12-15 years), high-school (age: 15-18 years) and university (age: approximately 18-22 years) during 2007-2022. Detailed explanations of the suicide motives have been described in previous reports^{4,7-10}, and detailed lists of categories and suicide numbers disaggregated by motive, sex and school are described in eTables 1-3.

The SSNPA did not release the number of student suicides for which the motive could not be determined. The MHLW publishes the "Basic Data on Suicide in the Region" (BDSR), which reaggregates the SSNPA data and disaggregates them into various subcategories. The BDSR also had not released number of student suicides for which the motive could not be determined until 2021. The BDSR provided for the first time in 2022 that motive-unidentified suicides numbers of students in 2022 were as followed: in middle-school males (unidentified/total: 14/73) and females (15/69), in high-school males (41/206) and females (17/146), university males (44/305) and females (24/133)³.

Statistical analysis

Interrupted time-series analysis (ITSA) is a powerful/established method for analyzing the impacts of intervention on changing trends and discontinuity (upward/downward shifts)¹¹⁻¹³. ITSA has the advantage of being able to incorporate various options, such as parametric, nonparametric regressions, seasonal variation and panel data analyses¹¹⁻¹³. Based on these advantages, a number of studies detected transformed trends in suicide mortality rates during the pandemic in Japan using this approach^{4,14}. However, ITSA cannot detect unknown fluctuations in the observation period.

In contrast, joinpoint regression analysis (JPRA) fits the simplest joinpoint model that the trend data allows and identifies significant points where trends change. This is a powerful statistical method for detection of unknown joinpoints (transformed trends and discontinuities)¹⁵. Therefore, fluctuations, including trends, discontinuity and their effect size of SMRP during 2007-2022 were analyzed by JPRA using Joinpoint Regression Program ver5.0.2 (the National Cancer Institute, Bethesda, Maryland)¹⁵⁻¹⁸. A comprehensive review of the statistics and underlying methodology applied in JPRA have been explained in a review report¹⁵. The detailed description of the methods used in the Joinpoint Regression Software is described in the user manual published by the National Cancer Institute (NCI)¹⁶. In this background, the present study analysed the fluctuations in SMRP during the 2007-2022 using JPRA. P value of <0.05 (two-tailed) were considered to indicate statistical significance.

The differences in SMRPs among schools (middle-school/high-school/university) and between sexes (male/female) from 2007-2022 were compared using linear mixed-effect model (LMM) with Scheffe's post-hoc-test by SPSS for Windows version 27 (IBM, Armonk, NY, USA)^{19,20}. When the data did not violate the assumption of sphericity ($p > 0.05$), the F value of the LMM was analyzed using sphericity-assumed degrees of freedom, whereas if the assumption of sphericity was violated ($p < 0.05$), the F value was analyzed using Greenhouse-Geisser corrected degrees of freedom. When the F value was significant ($p < 0.05$) by sphericity-assumed degrees or Greenhouse-Geisser corrected degrees of freedom, the F value of LMM were analyzed using Scheffe's post-hoc analysis ^{19,20}. P value of <0.05 (two-tailed) were considered to indicate statistical significance.

The differences in motives-unidentified student suicides among schools and between sexes were analyzed using the Cochran–Mantel–Haenszel test by SPSS. P value of <0.05 (two-tailed) were considered to indicate statistical significance. Cochran–Mantel–Haenszel test detected that motive-unidentified suicides were homogeneous among schools and between sexes.

eTable 1: SMRPs of Middle-School Students Disaggregated by Motives and Sex During 2007-2022.

	Males			Females		
	count	(	min / max)	count	(	min / max)
Total counts of suicide motives during 2007-2022	760	(	123 / 249)	635	(	14 / 83)
	mean	SD	(min / max)	mean	SD	(min / max)
Population (x1000)	1,753 ± 81	(	1,639 / 1,848)	1,676 ± 79	(	1,566 / 1,767)
Family problems	0.77 ± 0.34	(	0.27 / 1.52)	0.65 ± 0.38	(	0.17 / 1.47)
Conflict with parent	0.22 ± 0.12	(	0.06 / 0.49)	0.32 ± 0.19	(	0.11 / 0.77)
Marital conflict	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Conflict with other family members	0.07 ± 0.08	(	0.00 / 0.23)	0.07 ± 0.10	(	0.00 / 0.32)
Death of family	0.02 ± 0.04	(	0.00 / 0.12)	0.02 ± 0.03	(	0.00 / 0.06)
Hopeless for family	0.03 ± 0.04	(	0.00 / 0.12)	0.02 ± 0.03	(	0.00 / 0.06)
Severe verbal reprimand	0.38 ± 0.21	(	0.05 / 0.78)	0.18 ± 0.11	(	0.00 / 0.32)
Stress of raising children	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Physical and/or verbal abuse	0.00 ± 0.01	(	0.00 / 0.06)	0.00 ± 0.00	(	0.00 / 0.00)
Exhaustion from caring for infirm family	0.00 ± 0.01	(	0.00 / 0.05)	0.00 ± 0.00	(	0.00 / 0.00)
Health problems	0.29 ± 0.17	(	0.05 / 0.73)	0.39 ± 0.32	(	0.06 / 1.02)
Physical illness	0.04 ± 0.06	(	0.00 / 0.18)	0.04 ± 0.04	(	0.00 / 0.13)
Depression	0.09 ± 0.07	(	0.00 / 0.23)	0.13 ± 0.14	(	0.00 / 0.51)
Schizophrenia	0.01 ± 0.02	(	0.00 / 0.06)	0.01 ± 0.03	(	0.00 / 0.06)
Alcoholism	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Drug abuse	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Other mental illness	0.11 ± 0.07	(	0.00 / 0.28)	0.18 ± 0.23	(	0.00 / 0.83)
Physical disability	0.01 ± 0.02	(	0.00 / 0.06)	0.01 ± 0.03	(	0.00 / 0.13)
Economic problems	0.00 ± 0.02	(	0.00 / 0.06)	0.00 ± 0.00	(	0.00 / 0.00)
Bankruptcy	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Business struggling	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Unemployment	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Inability to find employment	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Economic hardships	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Overloaded with debt	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Assumption of excessive debt	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Debt (other)	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Harassment by debt-collectors	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Suicide for death benefit	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Employment problems	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Failure at work	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Inter-personal relations at work	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Trouble adjusting to changing work environment	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Work-related fatigue	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Romantic problems	0.09 ± 0.09	(	0.00 / 0.30)	0.08 ± 0.06	(	0.00 / 0.17)
Marital problems	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Heartbreak	0.06 ± 0.07	(	0.00 / 0.23)	0.04 ± 0.04	(	0.00 / 0.12)
Extra-marital affair	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Conflict in relationship	0.03 ± 0.04	(	0.00 / 0.12)	0.03 ± 0.04	(	0.00 / 0.12)
School problems	1.33 ± 0.42	(	0.97 / 2.62)	1.10 ± 0.62	(	0.34 / 2.62)
Entrance examination problems	0.18 ± 0.15	(	0.05 / 0.61)	0.12 ± 0.12	(	0.00 / 0.45)
Worrying about future	0.26 ± 0.17	(	0.06 / 0.79)	0.18 ± 0.19	(	0.00 / 0.77)
Underachievement	0.40 ± 0.13	(	0.22 / 0.79)	0.22 ± 0.16	(	0.00 / 0.57)
Interpersonal relations with teachers	0.05 ± 0.06	(	0.00 / 0.18)	0.03 ± 0.05	(	0.00 / 0.13)
Bullying	0.08 ± 0.06	(	0.00 / 0.22)	0.06 ± 0.05	(	0.00 / 0.19)
Conflict with classmate	0.15 ± 0.10	(	0.00 / 0.34)	0.29 ± 0.13	(	0.12 / 0.57)
Others problems	0.25 ± 0.20	(	0.00 / 0.79)	0.21 ± 0.18	(	0.00 / 0.57)
Public disclosure of crime	0.04 ± 0.05	(	0.00 / 0.12)	0.00 ± 0.02	(	0.00 / 0.06)
Crime victim	0.00 ± 0.02	(	0.00 / 0.06)	0.00 ± 0.00	(	0.00 / 0.00)
Copycat suicide	0.01 ± 0.03	(	0.00 / 0.11)	0.00 ± 0.02	(	0.00 / 0.06)
Loneliness	0.04 ± 0.08	(	0.00 / 0.30)	0.06 ± 0.08	(	0.00 / 0.26)
Neighborhood problems	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Total	2.74 ± 1.01	(	1.46 / 5.79)	2.42 ± 1.38	(	0.81 / 5.30)

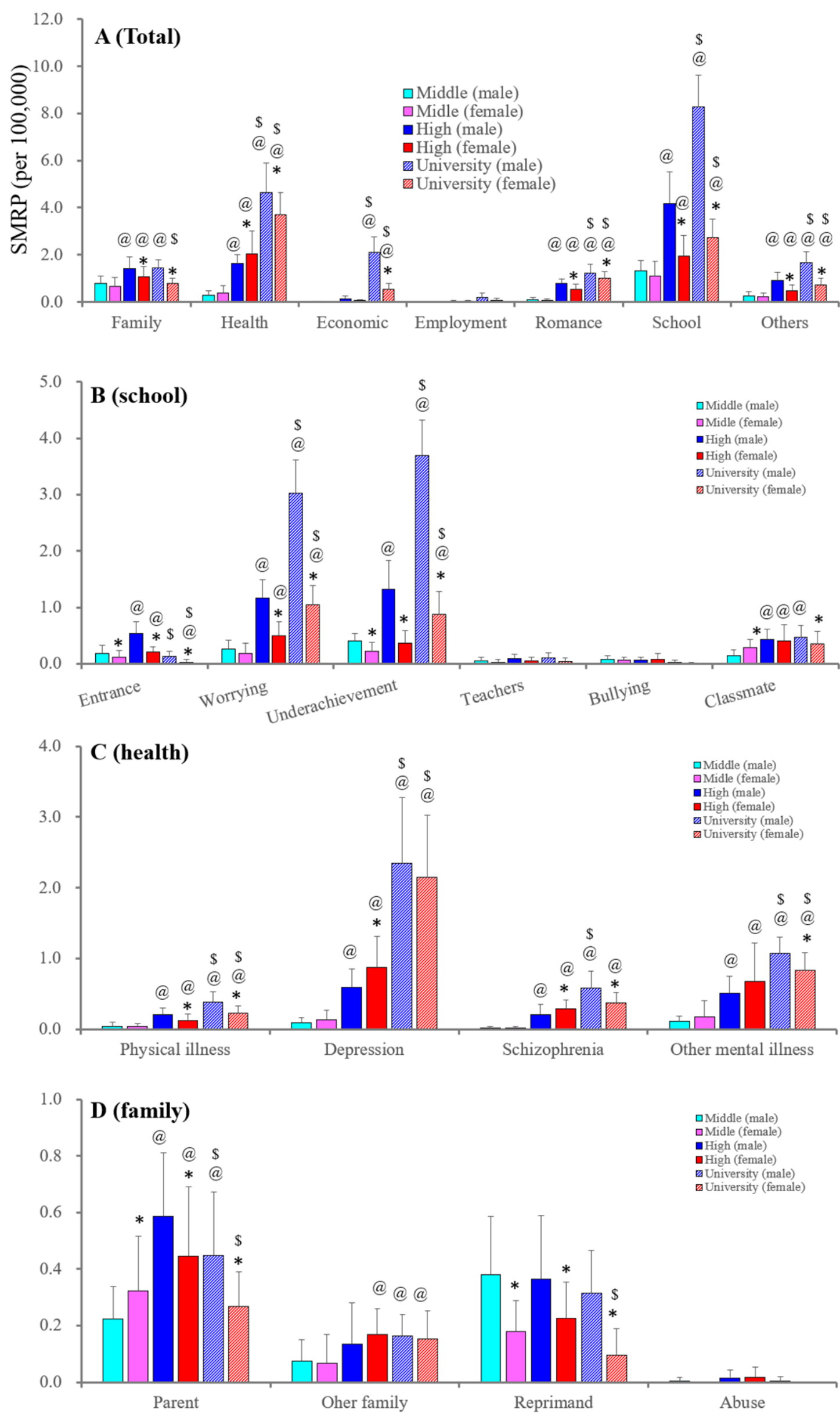
eTable 2: SMRPs of High-School Students Disaggregated by Motives and Sex During 2007-2022.

	Males			Females		
	count	(	min / max)	count	(	min / max)
Total counts of suicide motives during 2007-2022	2376	(	123 / 249)	1566	(	66 / 135)
	mean	SD	(min / max)	mean	SD	(min / max)
Population (x1000)	1,648 ± 68	(	1,499 / 1,724)	1,615 ± 60	(	1,458 / 1,674)
Family problems	1.42 ± 0.49	(	0.89 / 2.53)	1.06 ± 0.46	(	0.36 / 1.99)
Conflict with parent	0.59 ± 0.22	(	0.24 / 0.96)	0.44 ± 0.25	(	0.12 / 0.87)
Marital conflict	0.00 ± 0.00	(	0.00 / 0.00)	0.01 ± 0.02	(	0.00 / 0.07)
Conflict with other family members	0.13 ± 0.15	(	0.00 / 0.45)	0.17 ± 0.09	(	0.00 / 0.33)
Death of family	0.06 ± 0.05	(	0.00 / 0.13)	0.06 ± 0.07	(	0.00 / 0.21)
Hopeless for family	0.06 ± 0.05	(	0.00 / 0.18)	0.04 ± 0.05	(	0.00 / 0.20)
Severe verbal reprimand	0.37 ± 0.22	(	0.12 / 1.00)	0.23 ± 0.13	(	0.06 / 0.48)
Stress of raising children	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Physical and/or verbal abuse	0.02 ± 0.03	(	0.00 / 0.07)	0.02 ± 0.04	(	0.00 / 0.14)
Exhaustion from caring for infirm family	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Health problems	1.64 ± 0.38	(	1.03 / 2.33)	2.06 ± 0.95	(	1.11 / 4.53)
Physical illness	0.20 ± 0.09	(	0.06 / 0.39)	0.12 ± 0.09	(	0.00 / 0.30)
Depression	0.59 ± 0.27	(	0.00 / 1.06)	0.88 ± 0.43	(	0.31 / 1.99)
Schizophrenia	0.20 ± 0.14	(	0.00 / 0.48)	0.29 ± 0.12	(	0.06 / 0.48)
Alcoholism	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Drug abuse	0.01 ± 0.03	(	0.00 / 0.12)	0.01 ± 0.03	(	0.00 / 0.07)
Other mental illness	0.51 ± 0.24	(	0.12 / 1.20)	0.67 ± 0.54	(	0.18 / 2.08)
Physical disability	0.03 ± 0.05	(	0.00 / 0.20)	0.03 ± 0.04	(	0.00 / 0.14)
Economic problems	0.13 ± 0.11	(	0.00 / 0.40)	0.05 ± 0.04	(	0.00 / 0.14)
Bankruptcy	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Business struggling	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Unemployment	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Inability to find employment	0.05 ± 0.07	(	0.00 / 0.24)	0.02 ± 0.03	(	0.00 / 0.12)
Economic hardships	0.02 ± 0.04	(	0.00 / 0.13)	0.02 ± 0.03	(	0.00 / 0.06)
Overloaded with debt	0.00 ± 0.02	(	0.00 / 0.06)	0.00 ± 0.00	(	0.00 / 0.00)
Assumption of excessive debt	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Debt (other)	0.02 ± 0.04	(	0.00 / 0.13)	0.00 ± 0.00	(	0.00 / 0.00)
Harassment by debt-collectors	0.00 ± 0.01	(	0.00 / 0.06)	0.00 ± 0.00	(	0.00 / 0.00)
Suicide for death benefit	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Employment problems	0.03 ± 0.04	(	0.00 / 0.12)	0.03 ± 0.03	(	0.00 / 0.07)
Failure at work	0.00 ± 0.02	(	0.00 / 0.06)	0.00 ± 0.02	(	0.00 / 0.06)
Inter-personal relations at work	0.01 ± 0.02	(	0.00 / 0.06)	0.01 ± 0.03	(	0.00 / 0.07)
Trouble adjusting to changing work environment	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.02	(	0.00 / 0.06)
Work-related fatigue	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Romantic problems	0.78 ± 0.19	(	0.49 / 1.20)	0.54 ± 0.21	(	0.24 / 0.87)
Marital problems	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Heartbreak	0.52 ± 0.20	(	0.24 / 0.93)	0.25 ± 0.15	(	0.06 / 0.51)
Extra-marital affair	0.00 ± 0.02	(	0.00 / 0.07)	0.01 ± 0.02	(	0.00 / 0.07)
Conflict in relationship	0.21 ± 0.13	(	0.00 / 0.42)	0.22 ± 0.13	(	0.00 / 0.48)
School problems	4.17 ± 1.34	(	2.88 / 8.34)	1.94 ± 0.90	(	1.15 / 4.39)
Entrance examination problems	0.53 ± 0.21	(	0.18 / 1.00)	0.20 ± 0.10	(	0.00 / 0.39)
Worrying about future	1.17 ± 0.33	(	0.77 / 1.81)	0.49 ± 0.26	(	0.24 / 1.31)
Underachievement	1.32 ± 0.51	(	0.82 / 2.87)	0.36 ± 0.22	(	0.18 / 1.03)
Interpersonal relations with teachers	0.08 ± 0.08	(	0.00 / 0.33)	0.06 ± 0.06	(	0.00 / 0.18)
Bullying	0.06 ± 0.06	(	0.00 / 0.18)	0.08 ± 0.10	(	0.00 / 0.27)
Conflict with classmate	0.43 ± 0.19	(	0.24 / 1.07)	0.41 ± 0.29	(	0.18 / 1.30)
Others problems	0.92 ± 0.34	(	0.47 / 1.73)	0.48 ± 0.24	(	0.06 / 1.03)
Public disclosure of crime	0.09 ± 0.07	(	0.00 / 0.26)	0.04 ± 0.07	(	0.00 / 0.27)
Crime victim	0.00 ± 0.01	(	0.00 / 0.06)	0.02 ± 0.03	(	0.00 / 0.07)
Copycat suicide	0.02 ± 0.03	(	0.00 / 0.07)	0.03 ± 0.04	(	0.00 / 0.12)
Loneliness	0.25 ± 0.10	(	0.06 / 0.42)	0.17 ± 0.08	(	0.00 / 0.34)
Neighborhood problems	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.02	(	0.00 / 0.06)
Total	9.09 ± 2.40	(	7.33 / 16.61)	6.14 ± 2.39	(	4.01 / 12.69)

eTable 3: SMRPs of University Students Disaggregated by Motives and Sex During 2007-2022.

	Males			Females		
	count	(	min / max)	count	(	min / max)
Total counts of suicide motives during 2007-2022	5179	(	221 / 397)	1880	(	86 / 158)
	mean	SD	(min / max)	mean	SD	(min / max)
Population (x1000)	1,653 ± 33	(	1,621 / 1,702)	1,229 ± 57	(	1,127 / 1,304)
Family problems	1.43 ± 0.37	(	0.80 / 2.03)	0.80 ± 0.21	(	0.36 / 1.08)
Conflict with parent	0.45 ± 0.23	(	0.18 / 0.98)	0.27 ± 0.12	(	0.08 / 0.47)
Marital conflict	0.02 ± 0.03	(	0.00 / 0.06)	0.02 ± 0.04	(	0.00 / 0.09)
Conflict with other family members	0.16 ± 0.08	(	0.06 / 0.37)	0.15 ± 0.10	(	0.00 / 0.32)
Death of family	0.09 ± 0.06	(	0.00 / 0.24)	0.07 ± 0.07	(	0.00 / 0.23)
Hopeless for family	0.15 ± 0.10	(	0.00 / 0.37)	0.10 ± 0.08	(	0.00 / 0.26)
Severe verbal reprimand	0.31 ± 0.15	(	0.12 / 0.65)	0.10 ± 0.10	(	0.00 / 0.33)
Stress of raising children	0.00 ± 0.01	(	0.00 / 0.06)	0.02 ± 0.04	(	0.00 / 0.08)
Physical and/or verbal abuse	0.00 ± 0.02	(	0.00 / 0.06)	0.00 ± 0.00	(	0.00 / 0.00)
Exhaustion from caring for infirm family	0.01 ± 0.02	(	0.00 / 0.06)	0.00 ± 0.00	(	0.00 / 0.00)
Health problems	4.65 ± 1.24	(	2.70 / 7.29)	3.71 ± 0.94	(	2.65 / 5.24)
Physical illness	0.38 ± 0.15	(	0.12 / 0.76)	0.22 ± 0.10	(	0.08 / 0.35)
Depression	2.35 ± 0.93	(	1.11 / 4.33)	2.14 ± 0.88	(	1.22 / 3.94)
Schizophrenia	0.58 ± 0.24	(	0.25 / 1.13)	0.37 ± 0.15	(	0.15 / 0.67)
Alcoholism	0.01 ± 0.02	(	0.00 / 0.06)	0.00 ± 0.02	(	0.00 / 0.08)
Drug abuse	0.01 ± 0.02	(	0.00 / 0.06)	0.02 ± 0.04	(	0.00 / 0.09)
Other mental illness	1.07 ± 0.23	(	0.67 / 1.54)	0.83 ± 0.25	(	0.53 / 1.31)
Physical disability	0.06 ± 0.07	(	0.00 / 0.24)	0.02 ± 0.03	(	0.00 / 0.09)
Economic problems	2.09 ± 0.68	(	1.17 / 3.47)	0.53 ± 0.24	(	0.09 / 1.00)
Bankruptcy	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Business struggling	0.01 ± 0.02	(	0.00 / 0.06)	0.00 ± 0.00	(	0.00 / 0.00)
Unemployment	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Inability to find employment	1.30 ± 0.55	(	0.61 / 2.51)	0.38 ± 0.21	(	0.00 / 0.77)
Economic hardships	0.16 ± 0.10	(	0.00 / 0.37)	0.02 ± 0.04	(	0.00 / 0.08)
Overloaded with debt	0.10 ± 0.08	(	0.00 / 0.25)	0.01 ± 0.03	(	0.00 / 0.08)
Assumption of excessive debt	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Debt (other)	0.12 ± 0.10	(	0.00 / 0.37)	0.01 ± 0.04	(	0.00 / 0.15)
Harassment by debt-collectors	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Suicide for death benefit	0.00 ± 0.00	(	0.00 / 0.00)	0.00 ± 0.00	(	0.00 / 0.00)
Employment problems	0.21 ± 0.16	(	0.00 / 0.47)	0.07 ± 0.09	(	0.00 / 0.23)
Failure at work	0.04 ± 0.04	(	0.00 / 0.12)	0.01 ± 0.02	(	0.00 / 0.09)
Inter-personal relations at work	0.04 ± 0.06	(	0.00 / 0.18)	0.02 ± 0.05	(	0.00 / 0.15)
Trouble adjusting to changing work environment	0.02 ± 0.03	(	0.00 / 0.06)	0.00 ± 0.00	(	0.00 / 0.00)
Work-related fatigue	0.02 ± 0.04	(	0.00 / 0.12)	0.03 ± 0.05	(	0.00 / 0.17)
Romantic problems	1.23 ± 0.37	(	0.49 / 2.01)	1.00 ± 0.29	(	0.56 / 1.77)
Marital problems	0.04 ± 0.07	(	0.00 / 0.24)	0.02 ± 0.04	(	0.00 / 0.09)
Heartbreak	0.77 ± 0.28	(	0.25 / 1.23)	0.43 ± 0.13	(	0.23 / 0.67)
Extra-marital affair	0.01 ± 0.03	(	0.00 / 0.12)	0.05 ± 0.07	(	0.00 / 0.25)
Conflict in relationship	0.34 ± 0.17	(	0.00 / 0.71)	0.43 ± 0.17	(	0.00 / 0.67)
School problems	8.28 ± 1.35	(	6.46 / 10.60)	2.74 ± 0.76	(	1.68 / 4.37)
Entrance examination problems	0.13 ± 0.09	(	0.00 / 0.37)	0.03 ± 0.05	(	0.00 / 0.15)
Worrying about future	3.03 ± 0.59	(	2.03 / 3.96)	1.05 ± 0.34	(	0.48 / 1.84)
Underachievement	3.69 ± 0.64	(	2.64 / 4.55)	0.88 ± 0.40	(	0.24 / 1.67)
Interpersonal relations with teachers	0.10 ± 0.10	(	0.00 / 0.37)	0.04 ± 0.07	(	0.00 / 0.25)
Bullying	0.03 ± 0.04	(	0.00 / 0.12)	0.01 ± 0.02	(	0.00 / 0.08)
Conflict with classmate	0.47 ± 0.21	(	0.25 / 1.04)	0.35 ± 0.22	(	0.08 / 0.69)
Others problems	1.67 ± 0.46	(	1.04 / 2.77)	0.72 ± 0.29	(	0.16 / 1.16)
Public disclosure of crime	0.13 ± 0.06	(	0.06 / 0.25)	0.00 ± 0.02	(	0.00 / 0.08)
Crime victim	0.01 ± 0.02	(	0.00 / 0.06)	0.00 ± 0.00	(	0.00 / 0.00)
Copycat suicide	0.03 ± 0.03	(	0.00 / 0.06)	0.03 ± 0.04	(	0.00 / 0.09)
Loneliness	0.44 ± 0.29	(	0.12 / 1.23)	0.21 ± 0.17	(	0.00 / 0.70)
Neighborhood problems	0.01 ± 0.02	(	0.00 / 0.06)	0.01 ± 0.02	(	0.00 / 0.09)
Total	19.55 ± 3.04	(	13.57 / 24.09)	9.57 ± 1.79	(	6.89 / 12.16)

eFigure 1: Average of SMRPs Caused by Major 7 Categorized Motive and Impactable Subcategorized Motives of Students From 2007-2022.



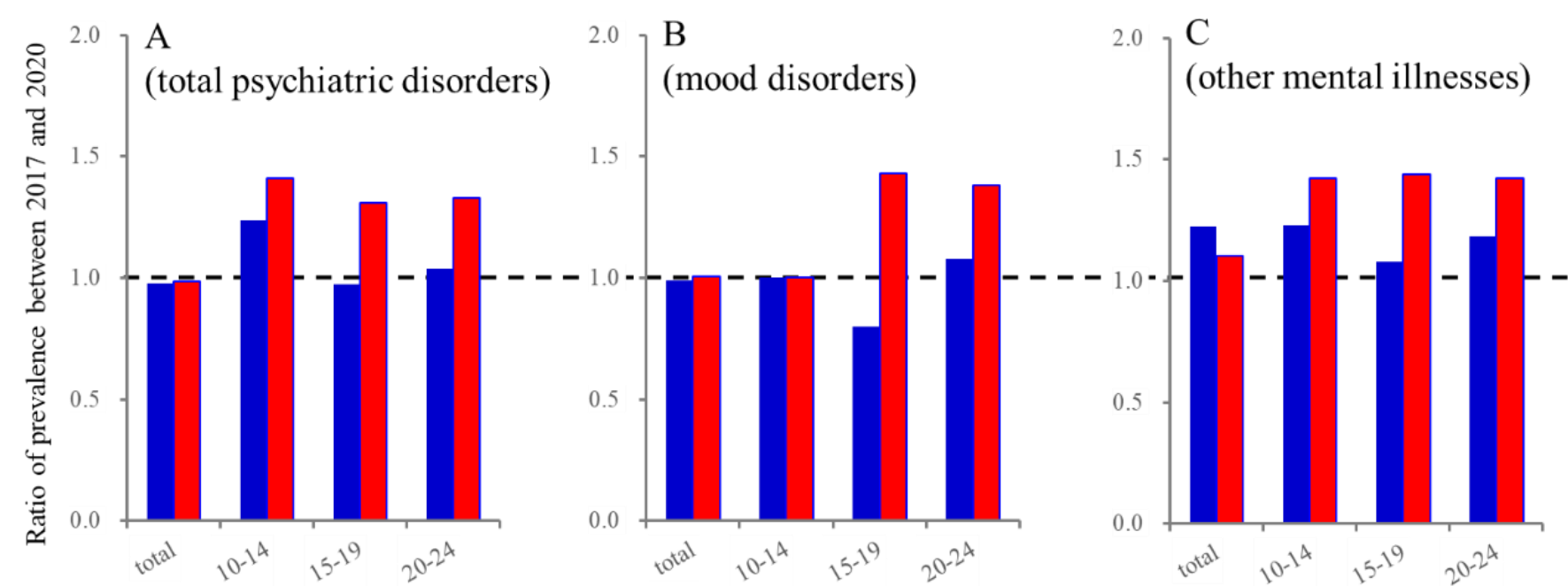
SMRPs caused by major 7 categorized motives (A), subcategorized motives in in school- (B), health- (C) and family-related motives (D) of males and females students in middle-school, high-school and university. Ordinate indicate mean±SD of SMRs from 2007-2022. *: P<0.05 relative to males of same school group, @:P<0.05 relative to middle-school of same sex, \$:P<0.05 relative to high-school of same sex, using linear mixed-effect model with Scheffe's post-hoc test.

eTable 4: Summary of Joinpoint of SMRP Caused by Suicidal Motives, Sex and School From 2007-2022 Analyzed by Joinpoint Regression Analysis

Males							Females						
Cohort		period	β	(95 % CI)	T	P	period	β	(95 % CI)	T	P		
Total	middle	2007-2021	0.04	(0.01 - 0.06)	3.31	0.006**	2007-2014	0.02	(-0.10 - 0.14)	0.28	0.786		
		2021-2022	0.58	(- -)	-	-	2014-2022	0.17	(0.07 - 0.26)	3.43	0.001**		
	high	2007-2018	0.01	(-0.01 - 0.03)	0.87	0.404	2007-2019	-0.09	(-0.05 - 0.03)	0.44	0.668		
		2018-2022	0.14	(0.06 - 0.23)	3.28	0.007**	2019-2022	0.18	(0.07 - 0.30)	3.19	0.009		
	university	2007-2009	0.11	(-0.16 - 0.37)	0.80	0.446	2007-2010	0.08	(-0.09 - 0.25)	0.89	0.400		
		2009-2021	-0.04	(-0.05 - -0.02)	-3.93	0.003**	2010-2016	-0.09	(-0.17 - -0.01)	-2.33	0.048*		
		2021-2022	0.46	(- -)	-	-	2016-2022	0.09	(0.03 - 0.15)	3.13	0.014*		
	School	middle	2007-2015	0.067	(0.04 - 0.10)	4.44	0.002**	2007-2009	0.59	(-0.26 - 1.44)	1.36	0.210	
2015-2020			-0.067	(-0.15 - 0.02)	-1.55	0.160	2009-2012	-0.29	(-1.14 - 0.56)	-0.68	0.517		
2020-2022			0.327	(0.06 - 0.60)	2.37	0.045*	2012-2022	0.15	(0.08 - 0.21)	4.31	0.003**		
high		2007-2016	0.00	(-0.04 - 0.04)	-0.15	0.881	2007-2019	-0.01	(-0.04 - 0.04)	-0.15	0.881		
		2016-2022	0.11	(0.04 - 0.18)	3.13	0.010*	2019-2022	0.11	(0.04 - 0.18)	3.13	0.009**		
university		2007-2012	0.06	(0.03 - 0.09)	3.71	0.006**	2007-2011	0.14	(-0.02 - 0.30)	1.76	0.116		
		2012-2020	-0.07	(-0.08 - -0.05)	-6.98	0.001**	2011-2016	-0.14	(-0.30 - 0.02)	-1.73	0.122		
		2020-2022	0.25	(0.12 - 0.39)	3.63	0.007**	2016-2022	0.13	(0.04 - 0.21)	2.97	0.018*		
(under-achievement)	middle	2007-2021	0.03	(0.00 - 0.01)	2.75	0.018**	2007-2022	0.02	(0.01 - 0.04)	3.96	0.001**		
		2021-2022	0.54	(- -)	-	-							
	high	2007-2012	0.06	(-0.04 - 0.17)	1.18	0.274	2007-2019	0.03	(-0.03 - 0.10)	0.96	0.356		
		2012-2016	-0.04	(-0.27 - 0.20)	-0.30	0.771	2019-2022	0.29	(-0.27 - 0.84)	1.01	0.333		
		2016-2022	0.13	(0.05 - 0.21)	3.29	0.011*							
	university	2007-2009	0.23	(-0.12 - 0.58)	1.30	0.229	2007-2013	0.13	(-0.05 - 0.32)	1.40	0.195		
		2009-2019	-0.05	(-0.08 - -0.02)	-3.03	0.016*	2013-2015	-0.66	(- -)	-	-		
		2019-2022	0.11	(-0.07 - 0.28)	1.22	0.257	2015-2022	0.19	(0.04 - 0.34)	2.51	0.033*		
(worry about future)	middle	2007-2021	0.00	(-0.01 - 0.01)	0.36	0.725	2007-2021	0.01	(0.00 - 0.03)	1.98	0.071		
		2021-2022	0.56	(- -)	-	-	2021-2022	0.54	(- -)	-	-		
	high	2007-2011	0.08	(-0.08 - 0.24)	1.03	0.334	2007-2008	0.80	(- -)	-	-		
		2011-2016	-0.05	(-0.21 - 0.11)	-0.61	0.560	2008-2018	-0.03	(-0.16 - 0.09)	-0.55	0.598		
		2016-2022	0.12	(0.03 - 0.20)	2.75	0.025*	2018-2022	-0.38	(-0.80 - 0.04)	-1.77	0.110		
	university	2007-2011	0.12	(0.02 - 0.22)	2.32	0.049*	Jump	1.68	(0.03 - 3.33)	2.35	0.046*		
		2011-2019	-0.08	(-0.12 - -0.03)	-3.46	0.009**	2007-2014	0.04	(-0.07 - 0.14)	0.73	0.482		
		2019-2022	0.15	(-0.01 - 0.31)	1.82	0.106	2014-2016	-0.22	(- -)	-	-		
								2016-2022	0.13	(0.00 - 0.27)	1.97	0.080	
(conflict with classmate)	middle	2007-2012	-0.01	(-0.08 - 0.05)	-0.38	0.713	2007-2013	0.02	(-0.01 - 0.05)	1.28	0.237		
		2012-2014	0.07	(- -)	-	-	2013-2017	-0.02	(-0.10 - 0.06)	-0.43	0.679		
		2014-2022	-0.02	(-0.05 - 0.01)	-1.22	0.254	2017-2022	0.07	(0.03 - 0.11)	3.78	0.005**		
	high	2007-2016	-0.03	(-0.10 - 0.04)	-0.78	0.455	2007-2017	0.00	(-0.06 - 0.06)	-0.03	0.974		
		2016-2020	0.05	(-0.34 - 0.44)	0.26	0.804	2017-2022	0.29	(0.11 - 0.46)	3.23	0.008**		
		2020-2022	0.40	(-0.38 - 1.18)	1.00	0.346							
	university	2007-2015	0.07	(0.00 - 0.14)	1.85	0.098	2007-2014	0.00	(-0.36 - 0.36)	0.00	0.999		
		2015-2021	-0.17	(-0.32 - -0.02)	-2.19	0.056	2014-2021	-0.15	(-0.60 - 0.30)	-0.65	0.532		
		2021-2022	1.54	(- -)	-	-	2021-2022	1.82	(- -)	-	-		
Health	middle	2007-2016	0.19	(0.12 - 0.25)	5.64	0.001**	2007-2009	0.44	(-0.37 - -1.25)	1.07	0.317		
		2016-2020	-0.36	(-0.71 - 0.00)	-1.95	0.087	2009-2012	-0.55	(-1.36 - -0.26)	-1.34	0.218		
		2020-2022	0.95	(0.24 - 1.67)	2.61	0.031*	2012-2022	0.27	(0.20 - -0.33)	8.31	0.001**		
	high	2007-2018	-0.03	(-0.06 - 0.00)	-1.94	0.079	2007-2017	-0.04	(-0.08 - -0.01)	-2.22	0.048*		
		2018-2022	0.17	(0.02 - 0.32)	2.27	0.044*	2017-2022	0.25	(0.14 - 0.37)	4.45	0.001**		
	university	2007-2018	-0.08	(-0.11 - -0.06)	-6.38	0.001**	2007-2016	-0.09	(-0.12 - -0.06)	-5.63	0.000**		
		2018-2022	0.11	(0.04 - 0.18)	3.05	0.011*	2016-2022	0.09	(0.03 - 0.14)	3.03	0.011*		
	(depression)	middle	2007-2016	0.01	(0.00 - 0.03)	1.81	0.107	2007-2010	0.07	(-0.10 - 0.23)	0.80	0.448	
2016-2019			-0.04	(-0.20 - 0.12)	-0.49	0.640	2010-2013	-0.11	(-0.44 - 0.22)	-0.66	0.528		
2019-2022			0.05	(-0.03 - 0.13)	1.20	0.264	2013-2022	0.04	(0.01 - 0.07)	2.60	0.031*		
high		2007-2022	-0.13	(-0.22 - -0.03)	-2.88	0.012*	2007-2022	-0.07	(-0.12 - -0.01)	-2.38	0.032*		
		Jump	0.56	(-0.14 - 2.90)	1.96	0.072*	Jump	1.27	(0.62 - 1.92)	4.23	0.001**		
university		2007-2017	-0.11	(-0.16 - -0.06)	-4.13	0.002**	2007-2015	-0.15	(-0.20 - -0.10)	-5.56	0.001**		
		2017-2022	0.10	(-0.05 - 0.25)	1.33	0.211	2015-2022	0.08	(0.01 - 0.14)	2.29	0.042*		
(other mental illness)		middle	2007-2022	0.01	(0.00 - 0.01)	1.75	0.102	2007-2013	-0.01	(-0.09 - 0.07)	-0.20	0.848	
						2013-2022	0.06	(0.01 - 0.10)	2.51	0.029*			
	high	2007-2010	-0.23	(-0.75 - 0.30)	-0.84	0.420	2007-2022	0.06	(0.01 - 0.10)	2.46	0.027*		
		2010-2022	0.09	(0.03 - 0.16)	2.98	0.013*	Jump	0.86	(0.19 - 1.52)	2.78	0.016*		
	university	2007-2020	0.01	(-0.02 - 0.04)	0.46	0.651	2007-2009	0.25	(-0.24 - 0.74)	1.01	0.342		
		2020-2022	0.22	(-0.32 - 0.76)	0.78	0.449	2009-2016	-0.05	(-0.13 - 0.04)	-1.13	0.291		
	Family	middle	2007-2022	0.06	(0.02 - 0.10)	3.09	0.008**	2007-2009	0.58	(-0.57 - 1.72)	0.98	0.356	
								2009-2011	-0.12	(-1.27 - 1.03)	-0.20	0.846	
					2011-2022	0.14	(0.05 - 0.23)	2.98	0.018**				
high		2007-2010	0.15	(-0.02 - 0.32)	1.71	0.126	2007-2011	0.25	(0.05 - 0.44)	2.43	0.041*		

		2010-2013	-0.14	(-0.49 - 0.20)	-0.81 0.444	2011-2013	-0.08	(-0.71 - 0.54)	-0.26 0.799
		2013-2022	0.11	(0.08 - 0.14)	6.77 0.001**	2013-2022	0.10	(0.05 - 0.17)	2.88 0.021*
	university	2007-2016	0.04	(-0.01 - 0.10)	1.49 0.169	2007-2009	0.589	(- -)	
		2016-2021	-0.09	(-0.29 - 0.10)	-0.93 0.375	2009-2011	-0.024	(-0.10 - 0.05)	-0.621 0.550
		2021-2022	0.65	(- -)	- -	2011-2022	0.063	(-0.09 - 0.22)	0.808 0.440
(conflict with parent)	middle	2007-2020	0.01	(-0.08 - 0.10)	0.21 0.839	2007-2020	0.12	(0.05 - 0.18)	3.57 0.004**
		2020-2022	0.49	(-1.18 - 2.16)	0.57 0.578	2020-2022	-0.21	(-1.45 - 1.03)	-0.34 0.743
	high	2007-2010	0.15	(-0.27 - 0.57)	0.72 0.494	2007-2011	0.33	(0.17 - 0.49)	4.14 0.003**
		2010-2014	-0.10	(-0.52 - 0.32)	-0.45 0.665	2011-2014	-0.06	(-0.55 - 0.44)	-0.23 0.824
		2014-2022	0.12	(0.02 - 0.21)	2.47 0.039*	2014-2022	0.14	(0.08 - 0.19)	4.94 0.001**
	university	2007-2017	0.02	(-0.06 - 0.09)	0.40 0.696	2007-2011	0.31	(-0.10 - 0.73)	1.47 0.174
		2017-2022	0.16	(-0.06 - 0.37)	1.43 0.181	2011-2013	-0.64	(- -)	- -
						2013-2022	0.15	(0.03 - 0.27)	2.40 0.040*
	middle	2007-2022	0.02	(0.00 - 0.04)	2.40 0.031*	2007-2022	0.02	(0.01 - 0.03)	3.62 0.003**
	high	2007-2021	0.04	(-0.03 - 0.10)	1.11 0.290	2007-2010	0.53	(-0.32 - 1.37)	1.23 0.251
		2021-2022	0.99	(- -)	- -	2010-2012	-0.44	(- -)	- -
(severe verbal reprimand)						2012-2022	0.05	(-0.08 - 0.18)	0.78 0.456
	university	2007-2014	0.02	(-0.04 - 0.08)	0.60 0.562	2007-2012	0.04	(-0.01 - 0.08)	1.57 0.145
		2014-2022	-0.02	(-0.07 - 0.04)	-0.59 0.568	2012-2022	-0.01	(-0.02 - 0.01)	-1.12 0.287

eFigure 2: Age-Dependent Ratio of Prevalence of Mental Disorders Between 2017 and 2020.



Ratio of prevalence of total psychiatric disorders (A), mood disorders (B) and other mental illnesses (C) between 2017 and 2020 (2020/2017) obtained from the “Patients Survey”²¹. Ordinates indicate the ratio of prevalence (2020/2017) of males (blue bars) and females (red bars), and abscissas indicate the range of age.

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