Mediating effects of social support and socioeconomic status on the association between childhood interpersonal adversity and adulthood mental health in Japan

Takashi Oshio*

Institute of Economic Research, Hitotsubashi University

Maki Umeda

Graduate School of Medicine, The University of Tokyo

Norito Kawakami

Graduate School of Medicine, The University of Tokyo

Correspondence: Takashi Oshio, oshio@ier.hit-u.ac.jp, 2-1 Naka, Kunitachi, Tokyo 186-8603, Japan, tel/fax +81-42-580-8372.

Abstract

In this study, we examined how the impact of childhood adversity on adulthood mental health was mediated by perceived social support and socioeconomic status (SES) in Japan, using micro data collected from surveys conducted in four municipalities in the Tokyo metropolitan area (N = 3,305). We focused on the self-reported experience of parental maltreatment and bullying in school. Our moderation analysis revealed that perceived social support and SES mediated 9–21% and 6–13%, respectively, of the impact of childhood adversity on selected mental health variables. The results highlight the mediating roles of social support and SES on the impact of adverse events in childhood on adulthood mental health. However, a large proportion of the impact was unexplained by either social support or SES, underscoring the need for reducing risks of parental maltreatment and bullying in school.

Key words

Childhood adversity, Social support, Socioeconomic status, Adulthood mental health, Mediation analysis, Japan

Research highlights

- We examined how the impact of child adversity on adulthood mental health was mediated by social support and SES in Japan.
- Social support and SES mediated 9–21% and 6–13%, respectively, of the impact of child adversity on mental health variables.
- The impact is largely unexplained by social support or SES, underscoring the need for reducing risks of child adversity.

Introduction

An increasing number of empirical studies have demonstrated that childhood adversity is a key determinant of adulthood mental health (Benjet et al., 2011; Felitti et al., 1998; Fujiwara et al., 2011; Kessler et al., 1997). It is widely acknowledged that interpersonal childhood adverse experiences contribute to the development of behavioral and psychological pathology and deteriorates health status in later life (Afifi et al., 2008; Afifi et al., 2009; Cerdá et al., 2010; Corso et al., 2009; Frisén & Bjarnelind, 2010; Gilbert et al., 2009; Gladstone et al., 2006; Horwitz et al., 2001; Schilling et al., 2008; Schneider et al., 2007; Weich et al., 2009). Evidence has been accumulating on the biological and psychological mechanisms that link childhood adverse experience to adulthood mental health (Cicchetti & Toth, 2005; McLaughlin et al., 2010). In recent years, more focus has been placed on interpersonal and social coping resources that have a negative impact on childhood adversities (Taylor et al., 2011).

Perceived social support is one of the potential mediators that are predictive of adulthood mental health (Kessler et al., 1985; Maher et al., 2006; Peirce et al., 2000). Previous literature have theorized that adverse interpersonal experience would deteriorate a perception of support and a sense of belonging, which would further result in enhancing negative attitudes toward others and impeding one's access to social support (Bradshaw & Garbarino, 2004; Brown et al., 2008a; Brown et al., 2008b; Kendler et al., 2002; Riggs et al., 2011). Notably, it has been argued that negative interaction with others and a lack of social support can cause stressful life events, vulnerability to stressors, and thus mental ill-health.

Cross-sectional studies have found that the association between interpersonal adversity and mental health is mediated by social support (Barchia & Bussey, 2010; Lara et al., 1999; Seeds et

al., 2010;). Nevertheless, when it comes to adulthood mediators and outcomes, the results were mixed. A longitudinal study of a birth cohort in the UK found that none of the emotional, instrumental, and negative supports has significant mediating effects on childhood physical abuse and the onset of adulthood mood and anxiety disorders (Ford et al., 2011). On the other hand, a population-based study in the US reported mediating effects of emotional support and negative interaction within the family and the association between childhood physical abuse and adulthood depressive symptoms (Shaw & Krause, 2002). Other studies have also shown that social support partly, rather than fully, mediates the impact of childhood interpersonal adversity (Hill et al., 2010; Kendler et al., 2002; Kendler et al., 2006; Vranceanu et al., 2007).

These results imply that the mediation effect of social support may be partial in the complex causal pathways, and that estimation of the degree to which social support plays a mediating role in the association is more informative than merely testing the significance of the mediating effect. Further investigation is also required on the broader types and levels of adulthood health outcomes, such as a lower level of psychological distress and subjective health, wherein social support possibly plays a mediating role (Schöllgen et al., 2011).

Another possible mediator between childhood interpersonal adversity and adulthood health is socioeconomic status (SES) (Packard et al., 2011). Previous studies have found that childhood adversity is associated with lower levels of educational attainment and earning income in later life (Duncan et al., 1998; Gilbert et al., 2009, Jansen et al., 2011; Oshio et al., 2010). Disadvantageous SES further affects health related behaviors and health status in adulthood (Braveman & Barclay, 2009; Kessler & Cleary, 1980). The mediating effect of SES in relation to childhood adverse experience has been understudied, however; SES is often treated as a

control variable in epidemiological research (McLaughlin et al., 2011). Therefore, determining the mediating effects of social support and SES holds considerable interest.

The aim of this study is to examine the extent to which social support and SES mediate the association between childhood adverse experience and adulthood mental health using large-scale population data in Japan. This can add new knowledge to the existing literature by explicitly estimating the proportion of mediating effects of perceived social support and SES to the total impact explained by childhood adverse experience on adulthood mental health.

In addition, our analysis will enable us to explore the mediating effects broadly and thoroughly in three ways. First, we examined mediating effects of both positive and negative aspects of perceived social support to determine their differences in impact. Although conflicts in support network were found to be a pathway to mental ill-health, its unique mediating effect on the impact of childhood interpersonal adversity has rarely been examined. The current study examined negative aspects of social support in order to include multiple facets of social support in determining its mediating effects. Second, we examined different types and levels of mental health outcomes: three levels of psychological distress, suicide ideation as an indicator for a health related risk behavior, and self-rated health as a reliable proxy for general health conditions (Idler & Benyamini, 1997). Third, we measured childhood bullying as well as parental maltreatment as two aspects of childhood interpersonal adversity, and considered the significant impact of peer relationships on the psychological and behavioral functioning in early life (Oyserman, 1993). A study from Japan will enable us to see the variation and constant of the mediating effects across different social settings.

Methods

Sample

Analysis was conducted on the data derived from the Japanese Study of Stratification, Health, Income, and Neighborhood (J-SHINE). We used the baseline data collected from October 2010 and February 2011 in four municipalities in and around the Tokyo metropolitan area. The selection of survey sites were based on the cooperation of local governments. Survey participants were community residents aged 25 to 50 years and were randomly selected from voter registration lists. The questionnaire was self-administered using a computer-assisted personal interview, unless the participants requested for a face-to-face interview. The total sample size was 4,117 (response rate = 31.6%). We analyzed the data of 3,305 respondents, and excluded 812 samples that had missing data, such as key variables of childhood adversity and adulthood mental health, as well as household income.

Measures

1. Childhood adverse experience

Two types of childhood adverse experience were included in our analysis: parent-perpetrated maltreatment and peer-perpetrated bullying. Childhood maltreatment included physical abuse and neglect before the age of 15 years, and was each measured by a single item: “Were you often pushed, or thrown an object at, or hit by either of your parents?” (physical abuse) and “Did your parents often fail to provide necessary care, such as three meals in a day, medical treatment, and other daily necessities?” (neglect). Those who had either physical abuse or neglect, or both of them, were coded as having childhood maltreatment. Bullying during childhood was measured by a single item that asked whether respondents were bullied in any form, including psychological bullying (being ignored and isolated by peers), physical bullying

(physical aggression and violence), and others (blackmails and loss of personal property), during the elementary and junior high school days (ages 7–14). If their responses were positive, they were asked how long they were bullied in total. Having been bullied for twelve months or longer was coded as having been bullied during childhood.

2. Adulthood mental health

General psychological distress was measured by K6 six-item questionnaire, using a 5-point scale (Kessler et al., 2002). We converted the original scales of 1–5 in the survey into 0–4 and calculated the total score, which ranged from 0–24. We adopted three cutoff points, instead of a single one, in order to examine the association with different levels of psychological distress: 13+ as an indicator for serious mental illness (Kessler et al., 2010), 5+ as an indicator for mood/anxiety disorder in Japan (Sakurai et al., 2011), and 9+ as a midpoint between the two cutoff points (Furukawa et al., 2003; Furukawa et al., 2008). Suicide ideation was measured by a single item question, which asked whether the respondent has ever considered committing suicide during the past year. A positive response to this single item was coded as having suicide ideation. In addition, we focused on self-rated health, taking into consideration that this subjective assessment of health is likely to be affected by general conditions on mental health. Self-rated health was measured by a single item using a 5-point scale that asked for a self-assessment on one's general health status. We coded the responses of the lowest two scores as having poor self-rated health.

3. Social support

Three types of perceived social support were included: emotional, instrumental, and negative support. Each type of support was measured by a single item: "How much helpful guidance do

the following people give you when you have problem or are in a trouble?" (emotional support), "how much practical support do the following persons give you when you need some help in your daily life?" (instrumental support), and "how often do the following persons irritate you?" (negative support). All items were based on a five-point scale (1 = *a lot*, 2 = *some*, 3 = *a little*, 4 = *never*, 5 = *not applicable*). The questions were asked for each of the following sources of support: (i) the spouse/partner, (ii) other coresiding family members, (iii) non-coresiding family members or relatives, (iv) neighbors, and (v) friends. We reversed the order of responses, summed up the reversed scores for each source of support, and divided the sum (ranging 5–25) into tertiles, to measure the level of perceived support for each type. The standardized internal consistency estimate was 0.95 for emotional support, 0.98 for instrumental support, and 0.95 for negative support.

4. SES

Household income, educational attainment, and occupational status were included as SES variables. For household income, respondents selected their household income from 15 income bands. We calculated a median for each band and equivalized the income by dividing by the root of the number of household members. Then, the standardized household income was divided into quintiles. If a respondent did not report household income, we imputed their household income with individual income only if he/she was working, unmarried, and residing with a parent. Educational attainment consisted of three categories: graduated from (i) junior high school, (ii) high school, and (iii) college or higher educational institute. Occupational status had three categories: (i) regularly employed (including managers), (ii) non-regularly employed (such as part-time workers), and (iii) unemployed and others (including housewives and

students).

5. Socio-demographics

As control variables, we included the following socio-demographic variables; age (25–29, 30–34, 35–39, 40–44, and 45–49), current family status (whether having a spouse or partner and whether having a child/children), and residential areas (binary indicator variables for each study site).

Analytical strategy

We conducted three-step hierarchical logit regressions to examine mediating roles of social support and SES on the different combinations of childhood adverse experience and adulthood health outcomes. In Model 1, we estimated the association between childhood adverse experience and adulthood mental health, controlling for socio-demographic variables. In Model 2, we added SES variables in the first model to determine any mediating effects of SES. If SES has a mediating effect, we would observe a substantial drop in the odds ratio and its statistical significance. In Model 3, we further added three types of social support variables to the second model, using the lowest teriles as reference categories. If perceived social support is a key mediator even after adjusting for socio-demographics and SES, we would observe a substantial drop in the odds ratio and its statistical significance.

Next, we conducted logistic regression analysis to examine the association between childhood adverse experience and mediating factors. This procedure was aimed at elucidating the mediating effects by testing the endogeneity, which is a key determinant of mediating effects; perceived social support and SES are affected by childhood adverse experience.

Finally, we conducted mediation analysis to compute the proportion of the association

mediated by social support and SES for each combination of childhood adverse experience and adulthood health outcomes (Baron & Kenny, 1986; Jasti et al., 2008; MacKinnon et al., 2007). We calculated the proportion of mediated association by comparing the rescaled coefficients on childhood adverse experience obtained with and without adding mediators to the logistic regression model that predicts the adulthood health outcome. All empirical analyses in this study were conducted using STATA software (ver. 11.0, Stata Corp LP).

Results

We begin with an overview of the basic features of the sample, which are summarized in Table 1. Of the total sample, 8.0% and 12.1% of the respondents had experienced parental maltreatment and bullying in school, respectively. As seen in the first part of the table, experiences of childhood adversity were positively associated with adulthood mental disorders (in terms of higher K6 levels and suicide ideation) as well as poor self-rated health. The second part shows that those with experiences of childhood adversity tended to have lower levels of emotional and instrumental support. The level of negative support was higher for those who had experienced child maltreatment; however, this association was not clear for bullying. The third and fourth parts of the table summarize the SES and socio-demographic features of the sample, respectively. We found that experiences of childhood adversity were associated with lower educational attainment and higher probability of being non-regularemployees than regular ones. There is no significant difference in income distribution between those with experiences of childhood adversity and those without them, but the former were more likely to belong to the lowest income quintile.

Table 2 summarizes the results of the three-step hierarchical regressions for the association

between childhood maltreatment and K6 = 5+. In Model 1, which controlled for socio-demographics only, we observed a highly significant association between childhood maltreatment and K6 = 5+, with OR = 2.64 (95% CI = (2.04, 3.41)). When we added SES in Model 2, the odds ratio for K6 = 5+ in response to childhood maltreatment declined slightly to 2.57, maintaining its statistical significance. Meanwhile, higher household income and higher educational attainment significantly reduced the probability of K6 = 5+. For occupational status, being unemployed substantially raised the probability of K6 = 5+. These findings suggest that SES mediates the impact of childhood maltreatment. However, the fact that K6 = 5+ remains highly associated with childhood maltreatment after adjusting for SES suggests that the mediating effect of SES is limited.

When further adding six indicator variables for perceived social support in Model 3, we found that emotional and negative supports are positively and negatively associated, respectively, with K6 = 5+. The odds ratio for K6 = 5+ in response to childhood maltreatment declined further to 2.26, but remained highly significant, suggesting a limited mediating effect of social support.

We repeated the three-step hierarchical regressions for other measures of adulthood mental disorders as well as bullying in school. Table 3 summarizes the estimated association between each adulthood mental health and each childhood interpersonal adversity. Model 1 confirmed strong associations between both types of childhood interpersonal adversities and mental health outcomes, showing stronger association with parental maltreatment than bullying. We also observed a dose-response relationship in the association with K6 scores. As the cutoff point for K6 increased from 5 to 9 and to 13, the odds ratio increased from 2.64 to 3.33 and to 4.25 for

childhood maltreatment as well, although this relationship is not clear for bullying (OR = 1.95 to 1.83 and to 2.47). The odds ratios for suicide ideation are found to be the highest for both childhood maltreatment and bullying (OR = 6.20 and 3.70 respectively).

In Model 2, the odds ratio for each health outcome declined modestly, maintaining its statistical significance, in the association with both childhood maltreatment and bullying. When we added social support in Model 3, we found a small decrease in odds ratios, and once again, statistical significance was maintained across all the combinations of childhood interpersonal adversity and adulthood mental health.

Table 4 shows the association of social support and SES with childhood adverse experience. Childhood maltreatment was positively associated with the lowest emotional and instrumental support and highest negative support (OR = 1.60, 1.45, and 2.19, respectively). Bullying was positively associated with the lowest instrumental support and highest negative support (OR = 1.29 and 1.26, respectively). Regarding the association between childhood adverse experience and SES, the lowest attainment in education and lowest household income were positively associated (OR = 2.02 and 1.34, respectively) and regular employment was negatively associated with childhood maltreatment (OR = 0.61). On the other hand, regular employment is negatively associated with childhood bullying (OR = 0.72).

Table 5 summarizes the proportions of the impact of child adversity mediated by social support and SES. We found that social support and SES, when combined, mediate 20.0% to 30.2% of the impact of childhood maltreatment on adulthood health, and 16.9% to 28.0% of the impact of childhood bullying. In relation to childhood maltreatment, social support has a larger impact (8.7 to 20.7%) than SES (6.4 to 11.3%). However, the difference between social support

and SES is not evident in the association with childhood bullying (6.8% to 15.5%, 6.0% to 12.5% respectively). Among the three types of perceived social support, negative support had the largest effect (6% to 16.2% for maltreatment; 3.8% to 7.3% for bullying) and instrumental support had the smallest effect (0.5% to 3.6% for maltreatment; 0.4% to 2.4% for bullying). We also found that the mediating effects of social support on self-rated health were relatively small (8.7% for maltreatment; 6.8% for bullying) compared to those of SES (11.3% for maltreatment; 10.1% for bullying).

Discussions and conclusion

In this study, we examined how the impact of childhood adversity on adulthood mental health was moderated by perceived social support and SES, using large-scale population data from Japan. Our analyses revealed three key findings.

First, the experience of childhood interpersonal adversity had a substantial, negative impact on adulthood mental health, having significant associations with all mental health outcomes that were investigated. Among them, suicide ideation had the strongest association with childhood interpersonal adversity. Maltreatment experiences were related to higher scores of K6: as severity of psychological distress increased, the association of childhood maltreatment became stronger. In addition, general health status was significantly poorer among those who had such adversity during childhood. The adverse impact of being bullied by school peers on adulthood mental health was observed as well, albeit to a lesser extent than that of being maltreated by parents. These results add consistent evidence that childhood interpersonal victimization by one's family and peers have long-term negative impacts on mental health (Frisén & Bjarnelind, 2010; Weich et al., 2009).

Second, our regression analysis confirmed mediating effects of perceived social support and SES through the following results: (i) childhood maltreatment and bullying were significantly associated with all of our adulthood mental health outcomes; (ii) childhood maltreatment and bullying had significant associations with the lowest degree of positive support, highest degree of negative support, and a lower SES attainment; and (iii) when social support and SES were added to the models as mediators, the strength of association between childhood adverse experience and adulthood mental health outcomes were reduced, yielding declining odds ratios.

This finding is inconsistent with a study by Ford et al. (2011), wherein none of the social supports had a significant mediating effect on the association between childhood physical abuse and adulthood mental disorders. A possible reason for this discrepancy is that the mediating effect of psychosocial resources may be less observed in the dichotomous outcomes of specific mental disorders. Indeed, significant mediating effect of social support was found in other studies that modeled severity of psychiatric symptoms and general health status as outcome variables (Barchia & Bussey, 2010; Seeds et al., 2010; Shaw & Krause, 2002; Vranceanu et al., 2007). Thus, it is reasonable to conclude that social and psychological resources mediate the impact of childhood adverse experience on adulthood mental health status, although its effect on the onset of mental disorders requires further scrutiny.

Third, our analysis showed that the mediating effects of social support and SES were relatively limited, although statistically significant. We found that the strength of associations between childhood adverse experience and adulthood mental health were not attenuated substantially even after controlling for perceived social support and SES. Our mediation analysis estimated that social support mediated 20% or less of the impact of childhood adverse

experience, if combined with SES, 30% or less, which is smaller than previously estimated mediating effects. Shaw and Krause (2002) found that the psychosocial variables (personal control, emotional support, instrumental support, and negative support) explained almost three quarters of the association between childhood physical abuse and adulthood depressive symptoms. In their study, however, personal control, a psychological characteristic of individuals, played the most influential mediating role, because it yielded the largest coefficient among other mediators.

Another noticeable finding is that the size of mediating effects varies among different types of predictors, mediators, and outcomes. For example, negative social support has a larger mediating effect than emotional and instrumental support. The effect of instrumental support was found to be as small as previous studies have indicated (Ford et al., 2011; Shaw & Krause, 2002). The mediating effect of SES was more influential among those who were bullied by peers than those who were maltreated by parents. Suicide ideation was mediated by social support and SES to a lesser extent in the case of bullying than that of maltreatment. Self-rated health is less mediated by social support in both cases of maltreatment and bullying. These results imply that an effective intervention strategy needs to be tailored on the basis of the targeted risk population and health outcomes.

Our estimation analysis highlighted the importance of the direct impact of childhood adversity on adulthood mental health, with limited mediating effects of social support and SES, which carries important implications for social policies. If social support is a major mediator of childhood interpersonal adversity, policies that aim to help individuals to obtain higher levels of positive social support can mitigate the negative impact of childhood adverse experience.

Similarly, financial aid in school education and job training may break the chain between child adversity and mental health, if SES variables substantially mediate the impact of child adversity. However, the current study suggests that policy measures to enhance social support and SES levels cannot fully offset adverse consequence of interpersonal victimization in childhood. More focus should be placed on policies that aim at reducing incidents of childhood maltreatment and bullying per se, both of which have long-lasting and direct impact on mental health.

Our results also addressed the importance of negative social support in developing mental ill-health among victims of maltreatment and bullying. The current study, wherein negative support had a larger mediating effect than positive support, is in accordance with previous studies that have found a mediating role of interpersonal conflicts in the association between childhood adverse experience and mental health (Brown et al., 2008a; Brown et al., 2008b; Kendler et al., 2002; Kendler et al., 2006). Some studies have explored the mediation mechanisms and discovered that childhood adverse experience can facilitate attachment insecurity and formulate negative views on self and others, which may result in interpersonal conflicts in social networks (Bradshaw & Garbarino, 2004; Lara & Klein, 1999; Riggs et al., 2011). In order to develop effective prevention policies and programs, more studies are required to accumulate evidence on the mediating role of negative support.

We recognize that this study has several limitations in addition to the limited sample size. First, the experiences of childhood adversity are based on the respondents' retrospective reports and may not be free from biases (Durrett et al., 2004; Hardt et al., 2006). The current mental conditions and satisfaction with relationships may affect the respondent's recall of the experience and either overestimate or underestimate the association. Although retrospective data

are considered valid to measuring childhood maltreatment (Maughan & Rutter, 1997), an objective source of information is preferable to capturing its impact more precisely. In addition, our measurements of childhood experience and social support are single items, which may not accurately measure all the aspects of these variables. For a detailed examination on the mechanisms of mediation, a more rigorous assessment may be required.

Second, there may be another pathway connecting childhood adversity and mental health. We focused on perceived social support and SES as social and psychological resources; however, factors, such as social capital or its individual perception, social network, self-esteem, sense of control, and sense of coherence are also potential mediators (Shaw & Krause, 2002). Covering a wider range of potential mediators should increase the proportion of the mediated impact. However, it is not likely to cause a substantial change in the results, given conceptual closeness between these variables with perceived social support and/or their subjective features.

Third, our analysis was based on a cross-sectional dataset, which made it difficult to identify any causality between mental health and perceived social support and SES. It may be that mental disorders discourage individuals from receiving social support and obtaining higher SES levels (Maher et al., 2006). In order to fully understand the relationship between childhood experience and its outcomes in later life, we will need longitudinal data.

In spite of these limitations, the current study adds new knowledge on the mediating effects of social support and SES. We found significant mediating effects of social support and SES on diverse mental health consequence of childhood interpesonal adversity even though the direct effect of childhood experience was more than three times as large as the mediating effect. Prevention of childhood interpersonal adversity itself has a greater impact on diminishing

negative mental health consequences rather than strengthening social and psychological resources afterwards.

Acknowledgements

The authors thank Prof. Hideki Hashimoto and his team for providing us data from the Japanese Study of Stratification, Health, Income, and Neighborhood (J-SHINE), for which data collection was supported by a Grant-in-Aid for Scientific Research (A) 2009-2013 (No. 20240061) from the Ministry of Education, Culture, Sports, Science, and Technology, Japan.. Analyses of the data and preparation for the manuscript were supported by a Grant-in-Aid for Scientific Research (A) 2009–2013 (No. 20240062 and 20240063) from the Ministry of Education, Culture, Sports, Science, and Technology, Japan

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Table 1
Summary statistics of the sample: Prevalence of mental ill-health, social support, SES, and socio-demographic characteristics among the total sample and those with childhood interpersonal adversities

	Total	Maltreated by parents		Bullied in school	
			p-value[a)]		*p*-value[a)]
Adulthood mental health					
K6 = 5+	34.1%	55.3%	<. 001	49.1%	< .001
K6 = 9+	15.1%	33.5%	< .001	24.1%	< .001
K6 = 13+	6.4%	18.4%	< .001	13.3%	< .001
Suicide ideation	1.6%	6.8%	< .001	4.5%	< .001
Poor self-rated health	10.6%	24.4%	< .001	17.3%	< .001
Emotional support					
Low	35.6%	42.1%	.08	44.9%	< .001
Middle	31.9%	29.7%		27.3%	
High	32.6%	28.2%		27.8%	
Instrumental support					
Low	34.9%	41.4%	.08	41.4%	.03
Middle	34.3%	30.1%		31.6%	
High	30.9%	28.6%		27.1%	
Negative support					
Low	40.0%	30.8%	< .001	41.6%	.58
Middle	25.8%	21.4%		23.6%	
High	34.1%	47.7%		34.8%	
Educational attainment					
Junior high school	2.9%	4.5%	.01	2.8%	.78
High school	39.6%	47.4%		41.4%	
College or above	57.4%	48.1%		55.9%	
Household income					
1st quintile (lowest)	21.1%	24.8%	.71	26.1%	.19
2nd quintile	19.1%	19.5%		15.8%	
3rd quintile	24.5%	22.6%		25.6%	
4th quintile	14.3%	12.0%		14.3%	
5th quintile	21.0%	21.1%		18.3%	
Occupational status					
Regularly employed	54.4%	45.1%	.03	47.9%	.14
Nonregularly employed	22.9%	30.5%		27.3%	
Self-employed	5.3%	4.5%		5.5%	
Unemployed	1.5%	1.9%		3.0%	
Others	15.9%	18.0%		16.3%	
Sex					
Male	48.6%	45.5%	.32	45.9%	.27
Female	51.4%	54.5%		54.1%	

Age (M = 37.4, S.D. = 7.1)					
25-29	18.7%	18.0%	.81	18.5%	.49
30-34	18.3%	18.8%		18.5%	
35-39	21.2%	19.2%		23.8%	
40-44	21.6%	21.1%		22.1%	
45-49	20.3%	22.9%		17.0%	
Family status					
Having a spouse/partner	69.9%	66.9%	.42	59.1%	<.001
Having a child (ren)	57.5%	54.9%		49.4%	
Number of observations	3,305 (100%)	266 (8.0%)		399 (12.1%)	

Note: a. Continuity-adjusted chi-squared test on the difference in prevalence of mental health outcomes, social support, SES and socio-demographics by exposure to childhood maltreatment and bullying.

Table 2
Estimated impacts of parental maltreatment on K6 = 5 + in adulthood: three-step hierarchical logit regressions

	Model 1 Socio-demographics[a)]		Model 2 Socio-demographics + SES		Model 3 Socio-demographics + SES + Perceived social support	
	OR	95% CI	OR	95% CI	OR	95% CI
Maltreated by parents	2.64	(2.04–3.41)	2.57	(1.99–3.33)	2.26	(1.73–2.97)
Perceived social support						
Emotional support[b)]						
Middle tertile					0.72	(0.58, 0.90)
Highest tertile					0.52	(0.39, 0.68)
Practical support[b)]						
Middle tertile					0.95	(0.77, 1.17)
Highest tertile					0.87	(0.66, 1.15)
Negative support[b)]						
Middle tertile					1.61	(1.31, 1.97)
Highest tertile					2.98	(2.42, 3.67)
Socioeconomic status (SES)						
Household income[b)]						
2nd quintile			0.78	(0.62, 0.99)	0.80	(0.62, 1.02)
3rd quintile			0.63	(0.50, 0.80)	0.64	(0.51, 0.81)
4th quintile			0.65	(0.50, 0.85)	0.68	(0.52, 0.90)
5th quintile (highest)			0.55	(0.42, 0.71)	0.58	(0.44, 0.75)
Educational attainment[b)]						
Junior high school			1.89	(1.25, 2.85)	1.99	(1.30, 3.02)
High school			0.97	(0.83, 1.14)	0.97	(0.82, 1.15)
Occupational status[b)]						
Nonregularly employed			1.22	(0.98, 1.51)	1.21	(0.97, 1.52)
Self-employed			1.11	(0.78, 1.57)	1.02	(0.71, 1.45)
Unemployed			4.23	(2.14, 8.36)	3.79	(1.93, 7.42)
Others			1.20	(0.93, 1.54)	1.18	(0.90, 1.53)
Pseudo R^2	0.0231		0.0549		0.0889	
Log pseudo likelihood	-2071.077		-2003.774		-1931.344	
Number of observations	3,305		3,305		3,305	

Note: a. Socio-demographics includes demographics (gender and age), current family status (having a spouse/partner and child (ren), and residential areas. Their estimation results are not reported to save space.
b. Reference categories for each perceived social support, household income, educational attainment, and occupational status are lowest tertile, 1st quintile, college or above, and regularly employed, respectively.

Table 3

Estimated impacts of parental maltreatment and bullying in school on adulthood mental health

Controlling for:	Model 1 Socio-demographics[a)]		Model 2 Socio-demographics + SES		Model 3 Socio-demographics + SES + perceived social support	
	OR	95% CI	OR	95% CI	OR	95% CI
Maltreated by parents						
K6 = 5+	2.64	(2.04, 3.41)	2.57	(1.99, 3.33)	2.26	(1.73, 2.97)
K6 = 9+	3.33	(2.52, 4.40)	3.23	(2.44, 4.26)	2.81	(2.10, 3.74)
K6 = 13+	4.25	(2.99, 6.06)	4.08	(2.86, 5.82)	3.49	(2.42, 5.03)
Suicide ideation	6.20	(3.45, 11.2)	5.91	(3.32, 10.5)	4.25	(2.42, 7.48)
Poor self-rated health	3.05	(2.24, 4.15)	2.86	(2.10, 3.89)	2.64	(1.94, 3.61)
Bullied in school						
K6 = 5+	1.95	(1.57, 2.42)	1.90	(1.53, 2.37)	1.86	(1.48, 2.34)
K6 = 9+	1.83	(1.41, 2.36)	1.73	(1.32, 2.26)	1.65	(1.25, 2.16)
K6 = 13+	2.47	(1.76, 3.46)	2.29	(1,60, 3.28)	2.18	(1.51, 3.14)
Suicide ideation	3.70	(2.21, 6.96)	3.43	(1.87, 6.29)	3.18	(1.71, 5.90)
Poor self-rated health	1.83	(1.46, 2.60)	1.75	(1.31, 2.35)	1.71	(1.27, 2.30)

Note: a. Socio-demographics includes demographics (gender and age), current family status (having a spouse/partner and child (ren), and residential areas.

Table 4

Odds ratios for obtaining perceived social support and SES in response to parental maltreatment and bullying in school, adjusted by socio-demographics[a)]

	Maltreated by parents		Bullied in school	
	OR	95% CI	OR	95% CI
Perceived social support				
Emotional support (highest tertile)	0.79	(0.59, 1.04)	0.86	(0.68, 1.09)
Emotional support (lowest tertile)	1.60	(1.22, 2.10)	1.29	(1.03, 1.62)
Instrumental support (highest tertile)	0.85	(0.65, 1.12)	0.90	(0.71, 1.14)
Instrumental support (lowest tertile)	1.45	(1.13, 1.86)	1.19	(0.95, 1.47)
Negative support (highest tertile)	2.19	(1.69, 2.82)	1.26	(1.01, 1.56)
Negative support (lowest tertile)	0.57	(0.44, 0.75)	0.91	(0.74, 1.12)
Socioeconomic status				
Graduating from college or above	0.62	(0.49, 0.79)	0.96	(0.79, 1.17)
Graduating from junior high school	2.02	(1.22, 3.35)	1.19	(0.72, 1.99)
Household income (top two quintiles)	0.82	(0.60, 1.10)	0.88	(0.68, 1.14)
Household income (bottom two quintiles)	1.34	(1.03, 1.76)	0.95	(0.75, 1.21)
Regularly employed	0.61	(0.47, 0.79)	0.72	(0.58, 0.91)
Unemployed	0.90	(0.39, 2.08)	1.69	(0.98, 2.91)

Note: a. Socio-demographics includes demographics (gender and age), current family status (having a spouse/partner and child (ren), and regional areas.

Table 5

Estimated proportions (%) of the impact of parental maltreatment and bulling in school on mental health in adulthood mediated by perceived social support and socioeconomic status, adjusted for socio-demographics

	Perceived social support				SES	Total
	Emotional	Instrumental	Negative	Total		
Maltreated by parents						(percent)
K6 = 5+	4.1	0.5	16.2	20.7	9.5	30.2
K6 = 9+	4.6	0.9	12.7	18.1	7.1	25.2
K6 = 13+	3.3	1.5	9.5	14.3	9.3	23.6
Suicide ideation	2.9	3.6	14.1	20.7	6.4	27.1
Poor self-rated health	1.7	0.7	6.4	8.7	11.3	20.0
Bullied in school						
K6 = 5+	4.1	0.4	6.4	10.9	11.2	22.1
K6 = 9+	7.2	1.0	7.3	15.5	12.5	28.0
K6 = 13+	4.9	1.4	4.9	11.3	11.2	22.5
Suicide ideation	2.7	2.4	6.1	11.3	6.0	17.3
Poor self-rated health	1.4	0.6	3.8	6.8	10.1	16.9

Note: Socio-demographics includes demographics (gender and age), current family status (having a spouse/partner and child (ren), and regional areas.