

Table 3 Odds ratio of socioeconomic status in childhood and covariates for major depression by discrete-time survival analysis, women

			Model 1 (univariate, adjusted for age)		Model 2 (+childhood characteristics)		Model 3 (+SES in adult)	
			OR	95% CI	OR	95% CI	OR	95% CI
SES in childhood	Parental education	0-11 years	ref		ref		ref	
		12 years	1.73	(0.97-3.09)	1.80	(1.01-3.21)	1.68	(0.97-2.92)
		13+ years	1.84	(1.01-3.33)	1.85	(1.00-3.42)	1.81	(1.03-3.18)
		Unknown	0.84	(0.52-1.37)	0.88	(0.54-1.44)	0.94	(0.56-1.55)
Childhood characteristics	Parental mental illness	Yes			2.48	(1.16-5.32)	2.17	(0.93-5.09)
		No			ref		ref	
	Physical illness	Yes			1.27	(0.51-3.19)	1.28	(0.50-3.32)
		No			ref		ref	
SES in adulthood	Education	0-11 years					ref	
		12 years					2.39	(1.19-4.81)
		13-15 years					1.95	(0.86-4.46)
		16+ years					2.45	(0.92-6.49)
	Annual household income	<3 million yen					ref	
		3- < 10 million yen					0.94	(0.60-1.47)
		10+ million yen				1.12	(0.59-2.14)	

Age was adjusted for all analysis. Values in bold are significant at the p = 0.05 level.

Association of SES with GAD

Table 4 shows the ORs of childhood SES for GAD among men. Higher parental education was significantly associated with the onset of GAD. Those whose parental education was high school or beyond high school were

5.63 (95% CI: 1.16–27.41) and 8.47 (95% CI: 1.87-38.37) times more likely to develop GAD, respectively, than those whose parental education was lower than high school in Model 1, which was slightly attenuated after adjusting for childhood characteristics and SES in adulthood

Table 4 Odds ratio of socioeconomic status in childhood and covariates for generalized anxiety disorder by discrete-time survival analysis, men

			Model 1 (univariate, adjusted for age)		Model 2 (+childhood characteristics)		Model 3 (+SES in adult)	
			OR	95% CI	OR	95% CI	OR	95% CI
SES in childhood	Parental education	0-11 years	ref		ref		ref	
		12 years	5.63	(1.16-27.41)	5.63	(1.15-27.47)	4.24 *	(0.96-18.74)
		13+ years	8.47	(1.87-38.37)	8.55	(1.84-39.72)	6.84	(1.62-28.94)
		Unknown	1.70	(0.40-7.20)	1.70	(0.40-7.20)	1.80	(0.42-7.72)
Childhood characteristics	Parental mental illness	Yes			1.15	(0.14-9.17)	1.11	(0.14-8.73)
		No			ref		ref	
	Physical illness	Yes			0.50	(0.07-3.69)	0.45	(0.06-3.37)
		No			ref		ref	
SES in adult	Education	0-11 years					ref	
		12 years					3.74	(0.62-22.49)
		13-15 years					2.85	(0.39-20.85)
		16+ years					3.54	(0.63-19.96)
	Annual household income	<3 million yen					ref	
		3- < 10 million yen					1.02	(0.29-3.62)
		10+ million yen				0.95	(0.20-4.51)	

Age was adjusted for all analysis. *p = 0.057. Values in bold are significant at the p = 0.05 level.

(Model 3). In contrast to the results for MD, no association was found between the onset of GAD and childhood physical illness.

On the other hand, among women, no association was found between childhood SES and the onset of GAD (Table 5). Moreover, no other covariates had any significant association with the onset of GAD, including SES in adulthood.

We also estimated our model excluding unknown parental education cases in order to complete a sensitivity analysis. No substantial change in our results was found.

Discussion

Unlike what has been found in previous studies in Western societies [8-13], we found that, among women, higher SES in childhood is positively associated with the onset of MD, but not GAD, even after adjusting for age, childhood characteristics, and SES in adulthood. In contrast, higher childhood SES among men is associated with GAD, but not with MD, after fully adjusting for other covariates. High SES in adulthood, represented as educational attainment, is also positively associated with MD for both genders.

Our results indicate that high SES in childhood has a direct effect on the onset of mental disorders in Japan. Previous studies on SES and mental disorders in Japan have reported inconsistent results; that is, higher educational attainment may [35] or may not be [16,17] associated with mental disorders. In our study, high childhood SES was positively associated with the onset of mental

disorders (more precisely, MD and GAD); however, the exact mechanism of this positive association is unknown. Asian parents tend to have stronger expectations for their children [36,37] in terms of educational achievements than do Western parents [38]. Similarly, Japanese parents, particularly those in higher SES families, have high expectations for their children [39,40]. Therefore, it is likely that those who come from high parental SES situations may feel more pressure to achieve; thus, they may feel distressed when they fail to do so into adulthood. Moreover, those who come from a high-SES family may have been overprotected during childhood, a phenomenon that has been shown to induce lower stress tolerance [41,42]. Thus, when they encounter stressful academic, professional, or social situations, they are more likely to develop mental disorders.

The impact of high SES in childhood has specific associations by gender and disorder. High childhood SES is associated with MD only among women, and it is associated with GAD only among men. This is probably due to gender differences in stress response [43]. Women tend to internalize stress and feel disappointment or decreased self-esteem when they face stressful situations [44-46]. Thus, women who experienced high SES in childhood are more likely to develop MD. Meanwhile, men with higher SES in childhood might feel more pressure and a heightened sense of personal responsibility when they enter middle age, resulting in the development of GAD. Previous studies have shown that childhood SES is positively associated with average levels of educational

Table 5 Odds ratio of socioeconomic status in childhood and covariates for generalized anxiety disorder by discrete-time survival analysis, women

			Model 1 (univariate, adjusted for age)		Model 2 (+childhood characteristics)		Model 3 (+SES in adult)	
			OR	95% CI	OR	95% CI	OR	95% CI
SES in childhood	Parental education	0-11 years	ref		ref		ref	
		12 years	0.40	(0.15-1.06)	0.42	(0.16-1.13)	0.40	(0.14-1.13)
		13+ years	1.39	(0.59-3.26)	1.34	(0.52-3.44)	1.27	(0.50-3.27)
		Unknown	0.85	(0.32-2.30)	0.92	(0.33-2.57)	0.85	(0.29-2.50)
Childhood characteristics	Parental mental illness	Yes			3.25	(0.79-13.34)	2.47	(0.42-14.38)
		No			ref		ref	
	Physical illness	Yes			2.64	(0.51-13.76)	3.11	(0.59-16.50)
		No			ref		ref	
SES in adult	Education	0-11 years					ref	
		12 years					0.64	(0.21-2.00)
		13-15 years					0.41	(0.08-2.17)
		16+ years					0.94	(0.17-5.20)
	Annual household income	<3 million yen					ref	
		3- < 10 million yen					0.48	(0.22-1.05)
		10+ million yen				0.61	(0.21-1.81)	

Age was adjusted for all analysis.

and occupational expectations throughout adulthood [47,48]. Furthermore, qualitative study is needed to confirm how women or men with high childhood SES deal with that stress.

Our results showed that respondents' educational attainment had independent associations with MD, regardless of gender. The directionality is unknown; that is, whether higher educational attainment is the cause of MD, or if MD induces higher educational attainment (although this is highly unlikely). Nonetheless, it is noteworthy to mention that childhood SES is independently associated with MD, regardless of SES in adulthood (i.e., educational attainment).

Several limitations of the current study suggest avenues for future research. First, this study used self-reports of SES in childhood and parental mental illness, rather than a direct assessment of the respondents' parents. However, previous studies that also used self-reported childhood SES [13] have found similar results [11]. Second, it is possible that we overestimated the association between childhood SES and mental disorders because of common method bias—that is, participants who have stressful memories related to parental SES might have been more likely to report symptoms of mental disorders. Third, although this study was population-based, and weighted analysis was used to adjust for the differences in demographic variables between the respondents and non-respondents, the comparatively small study sample size may not be representative of the whole Japanese population. Further investigation using a larger, nationally representative sample is warranted.

Conclusion

In Japan, childhood SES is likely to be positively associated with the lifetime onset of mental disorders, regardless of family history of mental disorders, childhood physical illness, or SES in adulthood. Further study is needed to replicate these findings and to elucidate other factors, such as parental pressures or social expectations.

Competing interests

The authors declare that they have no conflict of interest.

Authors' contributions

MO was involved in the literature review and the drafting of the manuscript. TF conceived the study hypothesis, performed the statistical analyses, and wrote the first draft, and RM helped to performed the statistical analyses and draft the manuscript. NK critically evaluated and revised the manuscript to ensure the inclusion of important intellectual content. All the authors read and approved the final manuscript.

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