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Original Contribution

Why Do Children from Socioeconomically Disadvantaged Families Suffer from Poor Health When They Reach Adulthood? A Life-Course Study

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The authors investigated what risk factors contribute to an excess risk of poor adult health among children who experience socioeconomic disadvantage. Data came from 1,037 children born in Dunedin, New Zealand, in 1972–1973, who were followed from birth to age 32 years (2004–2005). Childhood socioeconomic status (SES) was measured at multiple points between birth and age 15 years. Risk factors evaluated included a familial liability to poor health, childhood/adolescent health characteristics, low childhood intelligence quotient (IQ), exposure to childhood maltreatment, and adult SES. Adult health outcomes evaluated at age 32 years were major depressive disorder, anxiety disorders, tobacco dependence, alcohol or drug dependence, and clustering of cardiovascular disease risk factors. Results showed that low childhood SES was associated with an increased risk of substance dependence and poor physical health in adulthood (for tobacco dependence, sex-adjusted relative risk (RR) = 2.27, 95% confidence interval (CI): 1.41, 3.65; for alcohol or drug dependence, RR = 2.11, 95% CI: 1.16, 3.84; for cardiovascular risk factor status, RR = 2.55, 95% CI: 1.46, 4.46). Together, the risk factors studied here accounted for 55–67% of poor health outcomes among adults exposed to low SES as children. No single risk factor emerged as the prime explanation, suggesting that the processes mediating the link between childhood low SES and adult poor health are multifactorial.

cardiovascular system; cohort studies; health; social class; socioeconomic factors; substance-related disorders; tobacco use disorder

Abbreviations: CI, confidence interval; IQ, intelligence quotient; RR, relative risk; SES, socioeconomic status.

In industrialized countries, over 40 percent of the total burden of disease is related to mental disorders such as depression, anxiety, and alcohol- or drug-related disorders and cardiovascular disease (1). These disorders are especially frequent among adults who experienced socioeconomic disadvantage when they were children (2–14). However, past studies linking childhood socioeconomic status (SES) to adult health suffered from two important weaknesses.

First, with notable exceptions (2, 14–16), most prior studies examined one adult health outcome at a time—for example, depression (17), a substance-related disorder (8), or cardiovascular health (18–20). These studies relied on different methods, and it is difficult to combine their results to assess the overall burden of ill health associated with early-life disadvantage. One methodological difference has to do with sampling: Some studies were based on high-risk

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samples (17), and others were based on general population samples (3, 8, 15, 16, 19, 21) or on selected working populations (18). A second methodological difference has to do with the measurement of childhood socioeconomic disadvantage: Often, studies of different health outcomes used different measures of childhood SES (3, 8, 17, 20). A third methodological difference has to do with birth cohort effects: The meaning of socioeconomic categories changes with secular evolutions in education and labor market characteristics, and it is difficult to compare findings of studies carried out in different birth cohorts. Therefore, to ascertain the overall burden of ill adult health among children who experience socioeconomic disadvantage, it is necessary to study multiple adult health outcomes in a single cohort.

A second shortcoming of previous research is that the mechanisms through which the experience of early disadvantage influences lifelong health have not been thoroughly investigated. Candidate mechanisms need to 1) be especially frequent among children who grow up disadvantaged and 2) independently predict adult health. Several factors meet both criteria: 1) a familial liability to poor health (17, 22), 2) mental and physical health problems with onset during childhood or adolescence (16, 23–25), 3) low intelligence quotient (IQ) (15, 26, 27), 4) the experience of childhood maltreatment (19, 28, 29), and 5) low socioeconomic attainment in adulthood (17, 18, 20). Importantly, children from low-SES backgrounds simultaneously experience multiple types of adversity, suggesting that multiple mechanisms contribute to their excess risk of poor adult health. However, prior studies did not consider the role of a broad range of familial and individual hardships, leaving an incomplete picture of the processes that lead from childhood disadvantage to ill adult health.

We previously reported that children from the Dunedin Multidisciplinary Health and Development Study, based in Dunedin, New Zealand, who experienced socioeconomic disadvantage were at increased risk of a range of poor mental and physical health outcomes at age 26 years (2). However, at the time, study members had not reached their adult SES, and we were not able to examine the mechanisms that explained disadvantaged children's excess risk of ill adult health. The present study extended past research in two ways. First, we tested whether children who experienced socioeconomic hardship disproportionately suffered from various mental disorders, substance dependence, and poor physical health at age 32 years. Second, we examined the extent to which disadvantaged children's excess risk of poor adult health reflected 1) a liability to mental and physical disorders also present among their parents, 2) health risks that appeared while they were growing up, 3) low childhood IQ, 4) the experience of maltreatment early in life, and 5) low adult socioeconomic attainment.

MATERIALS AND METHODS

Study population

Participants were members of the Dunedin Multidisciplinary Health and Development Study (the Dunedin Study), a longitudinal investigation of health and behavior in a complete birth cohort (30). Study members ($n = 1{,}037$; 91 percent of eligible births; 52 percent male) were born in Dunedin, New Zealand, between April 1972 and March 1973 and participated in the first follow-up assessment at age 3 years. The cohort represents the full range of SES in the general population of New Zealand's South Island and is primarily White. Follow-up examinations have been carried out at ages 3, 5, 7, 9, 11, 13, 15, 18, 21, and 26 years, and most recently at age 32 years, when 972 study members were assessed (96 percent of the 1,015 study members still alive in 2004–2005). Data are collected at the Dunedin Study Research Unit during a full day of individual data collection.

Each phase of the Dunedin Study was approved by the Otago Ethics Committee (Otago, New Zealand), and study members gave informed consent before participating.

Measures

Socioeconomic status. The SES of the study members' families was measured on a six-point scale assessing parents' self-reported occupational status (31). The scale places each occupation into one of six categories (1 = unskilled laborer, 6 = professional) based upon the educational level and income associated with that occupation in data from the New Zealand census. The variable used in our analyses, childhood SES, is the average of the highest SES level of either parent, assessed repeatedly at the study members' births and at ages 3, 5, 7, 9, 11, 13, and 15 years. As previously reported, we distinguished three SES groups: high (groups 1 and 2 (e.g., manager, physician)), intermediate (groups 3 and 4 (e.g., secretary, electrician)), and low (groups 5 and 6 (e.g., cashier, textile machine operator)) (2).

Adult SES was assessed at age 32 years according to study members' self-reported occupation. Adult SES was classified as high, intermediate, or low, following the same classification as above (32).

Adult health outcomes. Psychiatric disorders diagnosed during the 12 months preceding the age-32 assessment were ascertained with the Diagnostic Interview Schedule (33, 34) in private interviews conducted by trained research interviewers who had a tertiary qualification in psychiatry, psychology, or a related discipline. Psychiatric disorders were diagnosed using the *Diagnostic and Statistical Manual for Mental Disorders*, Fourth Edition (35). Past-year prevalence rates in the Dunedin Study are comparable to past-year prevalence rates in the US National Comorbidity Study Replication (36). In this report, we examine major depressive disorder, anxiety disorders (generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, post-traumatic stress disorder, agoraphobia, social phobia, and simple phobia), tobacco dependence, and alcohol or drug dependence.

Cardiovascular disease risk factor status at age 32 years was ascertained during a physical examination using six biomarkers: overweight (body mass index (weight (kg)/height $(m)^2$) ≥ 30 or waist girth ≥ 88 cm in women or ≥ 102 cm in men), high resting blood pressure (systolic blood pressure ≥ 130 mmHg or diastolic blood pressure ≥ 85 mmHg), elevated nonfasting total cholesterol level

TABLE 1. Associations between childhood socioeconomic status and adult mental and physical health in the Dunedin Study, Dunedin, New Zealand, 1972–2005

	Major depressive disorder ($n = 958$; 157 cases)		Anxiety disorders ($n = 958$; 213 cases)		Tobacco dependence ($n = 965$; 185 cases)		Alcohol or drug dependence ($n = 954$; 137 cases)		Cardiovascular risk cluster* ($n = 860$; 140 cases)	
	Sex-adjusted RR†	95% CI†	Sex-adjusted RR	95% CI	Sex-adjusted RR	95% CI	Sex-adjusted RR	95% CI	Sex-adjusted RR	95% CI
Childhood socioeconomic status										
High	1.00		1.00		1.00		1.00		1.00	
Intermediate	0.79	0.54, 1.17	1.08	0.77, 1.51	1.48	0.94, 2.33	1.74	1.00, 3.02	1.51	0.89, 2.57
Low	1.21	0.79, 1.85	1.16	0.79, 1.72	2.27	1.41, 3.65	2.11	1.16, 3.84	2.55	1.46, 4.46
Sex										
Female	1.00		1.00		1.00		1.00		1.00	
Male	0.59	0.44, 0.79	0.72	0.57, 0.91	0.96	0.74, 1.24	2.18	1.55, 3.06	1.25	0.92, 1.69

* Participants with three or more cardiovascular disease risk factors.
† RR, relative risk; CI, confidence interval.

($\geq$240 mg/dl), low nonfasting high density lipoprotein cholesterol level ($\leq$40 mg/dl in men, $\leq$50 mg/dl in women), high glycated hemoglobin concentration (in the top quartile of the cohort's distribution), and low cardiorespiratory fitness (lowest quartile of the sex-specific distribution of maximal oxygen uptake). Ninety-two percent of the participants ($n = 892$) provided blood samples (always between 4:15 p.m. and 4:45 p.m.). Pregnant women ($n = 26$) were excluded from the reported analyses. As previously described, we assessed clustering of multiple cardiovascular disease risk factors by summing the number of biomarkers on which the study member was at risk. Participants with three or more risk factors were considered to have a cluster of cardiovascular disease risk factors (37).

Familial liability to poor health. When study members were aged 32 years, their biological parents were contacted and asked to report their own and the other parent's history of mental and physical health using well-established instruments, including the Family History Screen (38). Parental history of physical disorders was assessed following the Health Family Tree Study (39) and the National Heart, Lung, and Blood Institute Family Heart Study (40). This yielded valid information on parental health history for 96 percent of study members ($n = 976$). A parent was considered to have a positive history of a disorder if any informant reported it. In this study, we used either parent's history of depression, anxiety, tobacco smoking, alcohol problems, and heart disease (defined as a history of heart attack, balloon angioplasty, coronary bypass, or angina).

Childhood/adolescent health characteristics. Adolescent depression and anxiety disorders were assessed at ages 11, 13, 15, and 18 years in a psychiatric interview. Variable construction, reliability, validity, and evidence of impairment for diagnostic groups have been described elsewhere (30, 41). Adolescent tobacco, alcohol, and drug use were assessed at age 15 years. Adolescent tobacco smoking was defined as self-reported daily smoking in the 12 months preceding the assessment. Adolescent alcohol and drug use were defined as the self-reported use of alcohol or marijuana more than twice or use of any hard drug at least once during the 12 months preceding the assessment. Childhood body mass index was defined as the average of sex- and age-standardized body mass indexes at ages 5, 7, 9, and 11 years as calculated from physical measurements.

Childhood IQ. At ages 7, 9, 11, and 13 years, study members were assessed with the Wechsler Intelligence Scale for Children (42) by trained psychometrists. As previously described, scores from the four age periods were averaged into an overall score, which was standardized and reverse-coded to create a measure of low childhood IQ (37).

Childhood maltreatment. As previously described, adverse childhood experiences during the first decade of life (ages 3–11 years) were ascertained using behavioral observations, parental reports, and retrospective reports by study members once they reached adulthood (43). First, exposure to maternal rejection (reported for 14 percent of participants) was assessed at age 3 years by observational ratings of mothers' interactions with the study children. Second, exposure to harsh discipline was assessed at ages 7 and 9 years according to parental reports of disciplinary behaviors. Parents scoring in the top decile of the sample-wide distribution were classified as unusually harsh. Third, exposure to disruptive caregiver changes was assessed through age 11 years and was defined by two or more changes of the child's primary caregiver (6 percent of participants). Fourth, exposure to physical abuse (4 percent of participants) was assessed retrospectively at age 26 years on the basis of reports of multiple episodes of severe physical punishment resulting in lasting bruising or injury through age 11 years. Fifth, exposure to sexual abuse (12 percent of participants) was assessed retrospectively at age 26 years on the basis of reports of unwanted sexual contacts before age 11 years.

The health effects of childhood maltreatment appear to be cumulative, and we derived a cumulative exposure index for each child by counting the number of maltreatment experiences during the first decade of life (43, 44). Sixty-four

TABLE 2. Associations between childhood socioeconomic status and adult health according to selected risk factors in the Dunedin Study, Dunedin, New Zealand, 1972–2005

	No. of participants	%	Childhood SES*		Tobacco dependence ($n = 965$; 185 cases)		Alcohol or drug dependence ($n = 954$; 137 cases)		Cardiovascular risk cluster† ($n = 860$; 140 cases)	
			Pearson's correlation coefficient	*p* value	Sex-adjusted RR*	95% CI*	Sex-adjusted RR	95% CI	Sex-adjusted RR	95% CI
Familial liability to poor health										
Either parent was a smoker										
No	976	20.3	−0.19	<0.0001	1.00					
Yes		79.7			1.51	1.04, 2.21				
Either parent had an alcohol problem										
No	976	76.7	−0.14	<0.0001			1.00			
Yes		23.3					1.91	1.40, 2.61		
Either parent had heart disease										
No	948	75.7	−0.07	0.014					1.00	
Yes		24.3							1.63	1.19, 2.24
Childhood/adolescent health characteristics										
Adolescent tobacco smoking										
No	963	85.1	−0.14	<0.0001	1.00					
Yes		14.9			2.81	2.17, 3.66				
Adolescent alcohol/drug use										
No	959	81.2	−0.03	0.28			1.00			
Yes		18.8					2.03	1.46, 2.82		
Childhood body mass index‡	960		−0.08	0.005					1.00	
Per SD*									1.60	1.42, 1.80
Low childhood intelligence quotient (IQ)										
Per SD	987		0.41	<0.0001	1.23	1.09, 1.39	1.11	0.95, 1.30	1.31	1.12, 1.52
Experience of childhood maltreatment										
None	1,030	64.0	−0.17	<0.0001	1.00		1.00		1.00	
Probable		26.5			1.39	1.03, 1.87	1.20	0.85, 1.70	1.50	1.09, 2.08
Definite		9.5			2.62	1.91, 3.59	1.86	1.21, 2.86	1.33	0.80, 2.20
Adult SES										
High	985	26.3	0.32	<0.0001	1.00		1.00		1.00	
Intermediate		50.4			1.97	1.28, 3.02	1.61	1.02, 2.54	1.02	0.68, 1.54
Low		23.3			2.68	1.73, 4.16	1.96	1.21, 3.18	1.64	1.08, 2.49

* SES, socioeconomic status; RR, relative risk; CI, confidence interval; SD, standard deviation.
† Participants with three or more cardiovascular disease risk factors.
‡ Weight (kg)/height $(m)^2$.

percent of children experienced no maltreatment, 27 percent had one indicator of maltreatment (hereafter called ''probable maltreatment''), and 9 percent had two or more indicators of maltreatment (hereafter called ''definite maltreatment'').

Statistical analysis

We studied the association between childhood SES and adult health using Cox regression models with robust variance in which the time of follow-up was held constant (45). We

TABLE 3. Associations between childhood socioeconomic status and adult health, after adjustment for A) sex, B) a familial liability to poor health, C) childhood/adolescent health characteristics, D) childhood intelligence quotient, E) childhood maltreatment, and F) adult socioeconomic status in the Dunedin Study, Dunedin, New Zealand, 1972–2005

	Tobacco dependence		Alcohol or drug dependence		Cardiovascular risk cluster*	
	RR†	95% CI†	RR	95% CI	RR	95% CI
A. Models adjusted for sex						
Childhood SES†						
High	1.00		1.00		1.00	
Intermediate	1.48	0.94, 2.33	1.74	1.00, 3.02	1.51	0.89, 2.57
Low	2.27	1.41, 3.65	2.11	1.16, 3.84	2.55	1.46, 4.46
B. Models adjusted for sex and a familial liability to poor health						
Childhood SES						
High	1.00		1.00		1.00	
Intermediate	1.40	0.89, 2.22	1.69	0.98, 2.91	1.43	0.84, 2.44
Low	2.11	1.30, 3.42	1.83	1.00, 3.35	2.34	1.33, 4.11
Either parent was a smoker						
No	1.00					
Yes	1.39	0.95, 2.03				
Either parent had an alcohol problem						
No			1.00			
Yes			1.84	1.33, 2.53		
Either parent had heart disease						
No					1.00	
Yes					1.55	1.13, 2.14
C. Models adjusted for sex and childhood/adolescent health characteristics						
Childhood SES						
High	1.00		1.00		1.00	
Intermediate	1.40	0.89, 2.20	1.65	0.95, 2.88	1.47	0.86, 2.49
Low	1.80	1.09, 2.96	1.98	1.08, 3.62	2.14	1.22, 3.75
Adolescent tobacco smoking						
No	1.00					
Yes	2.64	2.00, 3.49				
Adolescent alcohol/drug use						
No			1.00			
Yes			2.01	1.45, 2.79		
Childhood body mass index‡						
Per SD†					1.55	1.38, 1.75

Table continues

chose this statistical method over logistic regression because the health outcomes we studied are frequent, causing odds ratios to overestimate relative risks by more than 10 percent.

First, we calculated sex-adjusted relative risks of major depression, anxiety disorders, tobacco dependence, alcohol or drug dependence, and cardiovascular disease risk factors in the low- and intermediate-childhood-SES groups as compared with the high-childhood-SES group (models A). Next, we successively adjusted for a familial liability to poor health (models B), childhood/adolescent health characteristics (models C), low childhood IQ (models D), childhood maltreatment (models E), and adult SES (models F). Our

TABLE 3. Continued

	Tobacco dependence		Alcohol or drug dependence		Cardiovascular risk cluster*	
	RR	95% CI	RR	95% CI	RR	95% CI
D. Models adjusted for sex and childhood IQ†						
Childhood SES						
High	1.00		1.00		1.00	
Intermediate	1.35	0.84, 2.17	1.61	0.91, 2.85	1.35	0.75, 2.40
Low	2.02	1.21, 3.38	2.05	1.08, 3.11	2.11	1.10, 4.04
Low childhood IQ						
Per SD	1.14	1.00, 1.30	1.03	0.86, 1.22	1.20	1.00, 1.43
E. Models adjusted for sex and childhood maltreatment						
Childhood SES						
High	1.00		1.00		1.00	
Intermediate	1.48	0.94, 2.32	1.77	1.02, 3.06	1.50	0.88, 2.56
Low	1.96	1.22, 3.16	1.98	1.09, 3.59	2.42	1.38, 4.26
Childhood maltreatment						
None	1.00		1.00		1.00	
Probable	1.33	0.99, 1.79	1.17	0.83, 1.65	1.40	1.00, 1.95
Definite	2.38	1.73, 3.29	1.81	0.17, 2.79	1.17	0.71, 1.91
F. Models adjusted for sex and adult SES						
Childhood SES						
High	1.00		1.00		1.00	
Intermediate	1.32	0.84, 2.08	1.61	0.93, 2.79	1.46	0.85, 2.51
Low	1.79	1.11, 2.92	1.81	0.99, 3.30	2.33	1.29, 4.19
Adult SES						
High	1.00		1.00		1.00	
Intermediate	1.84	1.20, 2.82	1.51	1.08, 2.38	0.93	0.61, 1.40
Low	2.34	1.50, 3.65	1.77	1.08, 2.77	1.36	0.88, 2.12
G. Models adjusted for sex, a familial liability to poor health, childhood/adolescent health characteristics, childhood IQ, childhood maltreatment, and adult SES						
Childhood SES						
High	1.00		1.00		1.00	
Intermediate	1.25	0.77, 2.02	1.42	0.80, 2.50	1.22	0.71, 2.11
Low	1.37	0.80, 2.33	1.47	0.78, 2.78	1.58	0.85, 2.94

* Participants with three or more cardiovascular disease risk factors.

† RR, relative risk; CI, confidence interval; SES, socioeconomic status; SD, standard deviation; IQ, intelligence quotient.

‡ Weight (kg)/height $(m)^2$.

final models (models G) included childhood SES, sex, familial liability to poor health, childhood/adolescent health characteristics, low childhood IQ, childhood maltreatment, and adult SES.

We compared fully adjusted relative risks (RRs) (models G) with those from the unadjusted models (models A) by calculating the percent change in the excess risk in the low-SES group:

$$\% \text{ change} = (RR_{nonadjusted} - RR_{adjusted})/(RR_{nonadjusted} - 1).$$

Additionally, we studied the overall number of health problems using Poisson regression models.

Data were analyzed using the SAS statistical package (version 9.1; SAS Institute Inc., Cary, North Carolina).

RESULTS

In the Dunedin Study, 20.5 percent of participants belonged to a low-SES group when they were growing up, 63.4 percent belonged to an intermediate-SES group, and 16.1 percent belonged to a high-SES group. At age 32 years, 16.4 percent had suffered an episode of major depression in the past year, 22.2 percent had an anxiety disorder, 19.2 percent were tobacco-dependent, 14.4 percent were alcohol- or drug-dependent, and 16.3 percent presented a cluster of cardiovascular disease risk factors at the physical examination.

Overall, at age 32 years, 28.8 percent of study members suffered from one health problem, 15.9 percent from two, 5.6 percent from three, and 2.2 percent from four. Study members who had experienced childhood disadvantage were especially likely to suffer from multiple health problems by the time they reached adulthood; compared with the high-SES group, sex-adjusted relative risks were 1.15 (95 percent confidence interval (CI): 0.90, 1.49) in the intermediate-childhood-SES group and 1.52 (95 percent CI: 1.15, 2.02) in the low-childhood-SES group.

By age 32 years, children who belonged to a low-SES group were at higher risk than those who belonged to a high-SES group of being tobacco-dependent (sex-adjusted RR = 2.27, 95 percent CI: 1.41, 3.65), of being alcohol- or drug-dependent (sex-adjusted RR = 2.11, 95 percent CI: 1.16, 3.84), and of presenting clustered cardiovascular disease risk factors (sex-adjusted RR = 2.55, 95 percent CI: 1.46, 4.46) (table 1). Children from socioeconomically disadvantaged families were not, however, at elevated risk of adult depression or anxiety disorders, and we did not include these two outcomes in subsequent analyses.

As table 2 shows, adults who had been low-SES children were more likely than those who had been high-SES children to carry a familial liability to poor health, to have had problems in childhood or adolescence (except for adolescent alcohol or drug use), to have had a low childhood IQ, to have experienced childhood maltreatment, and to have reached a lower adult socioeconomic level. As expected, these risk factors predicted an increased risk of poor adult health (although the association between childhood IQ and adult drug or alcohol dependence fell just short of statistical significance).

As table 3 shows, no single factor emerged as the prime explanation for disadvantaged children's excess risk of poor adult health: A familial liability to poor health, childhood/adolescent health characteristics, low childhood IQ, childhood maltreatment, and adult SES all contributed. When studied simultaneously, these factors accounted for 67 percent of the excess risk of adult tobacco dependence, 55 percent of the excess risk of adult alcohol or drug dependence, and 64 percent of the excess risk of clustered cardiovascular disease risk factors among adults who had been exposed to socioeconomic disadvantage as children.

DISCUSSION

We found that children who experience socioeconomic disadvantage are at high risk of suffering from tobacco, alcohol, or drug dependence and of having an unfavorable cardiovascular risk profile by the time they reach young adulthood. To our knowledge, this is one of the few studies to compare and contrast different disorders that contribute to the overall burden of ill adult health among children from socioeconomically disadvantaged families (2, 15, 16). This excess risk of poor health appears to be due to disadvantaged children's high levels of exposure to multiple types of adversity, including a familial liability to mental and physical disorders, childhood/adolescent health characteristics, low childhood IQ, exposure to childhood maltreatment, and low adult SES. No single factor emerges as a leading explanation, pointing to the multifactorial nature of the effects of childhood disadvantage on later health.

Several methodological strengths contribute to the validity of our findings. First, we studied a birth cohort with excellent follow-up at age 32 years, and our results were not affected by sample attrition. Second, study members' childhood socioeconomic position was measured prospectively and thus was not influenced by recall bias. Third, risk factors for poor adult health were assessed prospectively, using validated measures obtained from multiple informants.

Our study also had limitations. Most importantly, study participants were aged 32 years at the time of the latest study assessment, so we were not able to study clinical cardiovascular disease outcomes. Instead, we focused on clustered risk-factors, which have been shown to predict cardiovascular morbidity later in life (46). Furthermore, our data were right-censored, and study members will present with new health problems as they age. The onset of mental disorders peaks in adolescence and young adulthood, so the number of new cases that will occur is likely to be small (36). However, new physical health problems will emerge over time, and we will continue to assess these in the future.

In our study, participants who grew up disadvantaged were not at higher risk of major depression or anxiety disorders than those who came from more privileged families. While there is evidence that children and adults who experience socioeconomic disadvantage are at high risk of experiencing depression or anxiety concomitantly (24, 47–49), research on the long-term association between early-life socioeconomic position and the risk of such common mental disorders has yielded inconsistent results. Overall, studies that found that children from disadvantaged families experience poor mental health in adulthood examined high-risk samples (17, 50) or focused on symptoms of psychological distress rather than clinically significant disorders (3, 4, 6, 7). Studies based on population samples have not confirmed that children from disadvantaged backgrounds are especially prone to depression or anxiety by the time they reach adulthood (51, 52). Overall, these results are in line with our previous research, which highlights that adult experiences are key in determining people's risk of adult depression and anxiety, although small proportions of depressed and anxious persons have childhood risk factors (53, 54).

Several studies have indicated that adults' risk of substance-related disorders and poor cardiovascular health starts early in life (8–12, 19, 20, 55). Our study adds to this research by showing that these life-course health disparities reflect multiple risk factors. The Dunedin cohort is based in New Zealand, and it is important to consider whether our findings apply to other populations. New Zealand is similar to other industrialized countries in terms of labor market characteristics (56), health patterns (57), and socioeconomic health gradients (2, 58); therefore, our conclusion about the multifactorial nature of the association between childhood SES and adult health is likely to hold elsewhere. However, prevalence rates of mental and physical disorders, distributions of specific risk factors, and associations between socioeconomic circumstances and health may vary across populations. Therefore, the mechanisms that mediate low-SES children's risk of poor adult health may be context-specific and should be investigated in different settings.

Children who experience socioeconomic disadvantage are at high risk of suffering from multiple disorders by the time they reach adulthood. This reflects their experience of a broad range of hardships. Recent evidence showing that early interventions among high-risk children produce long-term cognitive, health, and social benefits (59) imply that it is possible to counteract the effects of early disadvantage and help children from deprived backgrounds beat the odds.

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