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Cumulative risk of compromised physical, mental and social health in adulthood due to family conflict and financial strain during childhood: a retrospective analysis based on survey data representative of 19 European countries

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ABSTRACT

Background Childhood adversity (CA) has previously been linked to various health problems in adulthood. Investigations into the differential impact of distinct types of CA on a wide range of outcomes are scarce. This study aimed to assess the impact of self-reported childhood family conflict and/or financial strain on health and social functioning in adulthood among Europeans, while taking into account the mediating role of adulthood socioeconomic disadvantage (SED) in these associations.

Methods Using the European Social Survey (ESS) collected in 2014, nationally representative cross-sectional data from 35 475 participants aged 15 years and older in 19 European countries were analysed. Logistic regressions were conducted to assess associations of retrospectively reported family conflict and/or financial strain in childhood with physical and mental health as well as health behaviours and social functioning in adulthood.

Results A quarter of the European population reported having experienced family conflict, financial strain or both in childhood. Financial strain was reported more among older age groups and conflict more among younger age groups. A dose-response pattern with increased risk was demonstrated for almost all physical, behavioral, mental and social outcomes for these aspects of CA compared with no CA, with the highest risk observed in those who experienced both financial strain and family conflict. Adulthood SED mediated a significant proportion of the associations with financial strain (ranging from 5.4% to 72.4%), but did not mediate the associations with conflict.

Conclusion Individuals reporting family conflict or financial strain during childhood are at increased risk of developing a wide range of health and social problems. Those who report financial strain in childhood are more likely to experience SED in adulthood, which in turn increases their risk of experiencing health and social problems. Reported family conflict during childhood conferred increased risk of health and social problems, but adulthood SED did not appear to operate as an indirect pathway.

Key questions

What is already known?

- Childhood adversity has been shown to have various deleterious consequences for health in adulthood.
- Most research has focused on either specific adverse experiences or economic hardship, but seldom both.
- Many such studies assess the impact on single health outcomes, but childhood adversity may affect a multitude of health and social outcomes.

What are the new findings?

- A quarter of the European population reports having experienced financial strain or family conflict in childhood.
- Each of these adversities is associated with significant increased risk of having problems in a wide range of areas in adulthood, that is, problems pertaining to physical health, health behaviours, mental health and social functioning.
- A dose-response relationship was observed where each increases in the number of adversities was associated with greater risk.
- Socioeconomic disadvantage in adulthood was a mediator for financial strain, but not conflict.

What do the new findings imply?

- Childhood adversity in the form of family conflict and financial strain increases the risk for numerous negative health outcomes across physical, mental and social domains.
- These outcomes are likely to accumulate and exacerbate each other over time, ultimately intensifying disease trajectories and reducing quality of life.
- Unless buffered by protective factors or interrupted through interventions, the accumulation of these problems is likely to create multiple complex costly care needs and unfavourable conditions among those affected.

INTRODUCTION

A life-course approach in public health[1] is essential as decades of research has documented the negative impacts of childhood adversity (CA)[2 3], as well as the positive effects of early care and nurture on adult health/functioning.[3] One of the most influential and widely cited studies in the context of CA is the Adverse Childhood Experiences Study conducted by the Centers of Disease Control and Kaiser Permanente in 1995–97.[4] Since then, research on the impact of child trauma and adversity has accumulated and developed into a robust and comprehensive evidence-base.[5] In general, CA has been found to be associated with increased risk of physical health problems (eg, somatic illnesses and disability), mental health problems (eg, mental and substance use disorders, suicidality), poor health behaviours or risk behaviours (eg, smoking, multiple sexual partners) and social problems (eg, intimate partner violence, social isolation).[2 3 6 7] The consequences of CA on adult health may operate through various different pathways—physiological,[2 3 8–11] psychological[2 4 9 10 12 13] and social.[6 13] While these may operate as independent pathways, they may also be health outcomes in and of themselves, and may reinforce each other over time.

Most previous research on CA has focused on either social deprivation (eg, poverty, low education, unemployment) or specific adverse experiences such as childhood trauma, neglect, or physical, sexual, or psychological abuse. The current study focuses on the experience of financial strain and/or conflict in the childhood family environment. Both of these factors contribute to CA, but are distinct from each other, that is, families may be characterised by one without the other, or both may exist simultaneously. Whereas financial strain is typically prevalent in materially poor households, conflict may take place in households across all social classes (although some adversity related to conflict may follow a social gradient[2 14]). This also means that these two forms of CA may have differential impacts on adult health and social functioning, yet, such differential impacts have received little attention in the literature.

Socioeconomic disadvantage (SED) in adulthood, even in the absence of adversity during childhood, has been extensively demonstrated to have negative health consequences.[15] Thus, health and social problems in adulthood may result from SED in adulthood, in childhood or both. Economic hardship during childhood can transfer into SED in adulthood, which in turn, may become a risk factor for compromised health. This mechanism is referred to as a 'chain of disadvantage'. For example, a child growing up in a household characterised by financial strain is likely to face poorer education and obstacles to effective learning. These factors may in turn translate into disadvantage in adulthood in terms of occupational status, income, accommodation, residential area or other factors, all of which may involve a variety of stressors (eg, unsafe neighbourhoods, occupational health hazards, unmet needs for housing or food) that compromise health.[15] However, previous literature indicates that chains of disadvantage may only partly account for the influence of CA on adult health and social functioning.[12 16 17] In terms of family conflict, given that this may occur across all social classes,[2] it is possible for it to be a predictor of adult health and social functioning, regardless of adulthood SED.

The aim of the current study was therefore to assess the influence of childhood family conflict / financial strain on a wide range of outcomes in adulthood, i.e. general health (hampering health conditions, cancer, obesity, self-rated health, access to healthcare), health behaviours (smoking, binge drinking, physical activity, diet, sedentary behaviour), mental health (depression, life satisfaction, happiness, loneliness, feelings of safety in local area) and social functioning (social interactions, social isolation, social trust, divorce) in Europe. The aim was to assess direct associations between these variables and adult health outcomes, and of the role of adulthood SED as a mediator. To achieve this aim, we conducted a study using nationally representative data from round 7 of the European Social Survey (ESS) 2014. Based on the aforementioned literature, we hypothesised that (1) each type of CA (financial strain; conflict) would be associated with increased risk of problems pertaining to physical health, health behaviours, mental health and social functioning in adulthood; (2) the accumulation of financial strain and conflict experienced in childhood would reflect a dose-response pattern with increased risk for health and social functioning problems in adulthood along for increases in the number of adversities, and (3) adulthood SED would mediate the relationships, particularly between financial strain and adult health outcomes.

METHODS

Study design

The ESS is a biennially repeated cross-sectional survey conducted in numerous European countries and Israel. We used data specifically from the special module on the social determinants of health,[18] which was only created for the seventh round of the survey collected in 2014. The ESS selected participants using strict probability samples of the resident national population aged 15 years or older living in private households. Data were gathered via face-to-face interviews with standardised questionnaires. Statistical data and comprehensive methodological documentation are freely available on the website of the ESS (www.europeansocialsurvey.org). For this analysis, we included 19 of the available 21 ESS countries. We excluded Czech Republic because it did not include several health variables that were otherwise part of the main questionnaire, and Israel because it is not a European country. The sample sizes and response rates for the individual countries are shown in table 1. The total sample size for the pooled countries was 35 475.

Table 1 Countries, participants and response rates in the European Social Survey round 7 (2014)

	Participants (N)	Response rate (%)
Belgium	1769	57.0
Switzerland	1532	52.7
Germany	3045	31.4
Denmark	1502	51.9
Estonia	2051	59.9
Spain	1925	67.9
Finland	2087	62.7
France	1917	50.9
UK	2264	43.6
Hungary	1698	52.7
Ireland	2390	60.7
Lithuania	2250	68.9
The Netherlands	1919	58.6
Norway	1436	53.9
Poland	1615	65.8
Portugal	1265	43.0
Sweden	1791	50.1
Slovenia	1224	52.3
Austria	1795	51.6
Total	35 475	

Patient and public involvement

This study is a secondary data analysis with no human subject issues. Information regarding patient and public involvement can be found on the ESS website. The ESS subscribes to the Declaration on Professional Ethics of the International Statistics Institute.[19] According to this declaration, participants must be protected against potentially harmful effects of taking part in the survey. Following this, participation was based on participants' freely given informed consent.

Measures

Outcomes: general health, health behaviours, mental health, social functioning

For this analysis, we used 20 different binary outcomes pertaining to four categories: (1) general health, (2) health behaviours, (3) mental health and (4) social functioning. All outcomes are briefly mentioned here, and are described in detail in online supplemental appendix 1. Some are based on validated scales (ie, depression) or standard formulas (ie, obesity). All are commonly used in other international surveys (an overview of the outcome variables for the specific ESS module can be found elsewhere[18]). General health and access to healthcare outcomes included being hampered by one or more of 11 physical health problems (heart orcirculation problem; high blood pressure; breathing problems such asasthma attacks, wheezing or whistling breathing; allergies; back or neckpain; muscular or joint pain in hand or arm; muscular or joint pain infoot or leg; problems related to stomach or digestion; problemsrelated to a skin condition; severe headaches; diabetes); cancer; obesity; self-rated health (rated bad or very bad) and having been unable to get needed medical consultation or treatment within the past 12 months (for reasons suc as "Could not pay for it", "Had other commitments", "Needed treatment was notavailable in local area or nearby", "The waiting list was too long", "Therewere no appointments available", or "Other reason"). Health behaviour outcomes included being a smoker; binge drinking (daily/weekly/monthly); no sport or physical activity within the past 7 days; poor diet (fruit and vegetable consumption never or less than weekly) and sedentary behaviour (>3 hours of TV watching per day on average). Mental health outcomes included depression; dissatisfaction with life (lowest three life satisfaction categories); unhappiness (lowest three happiness categories); loneliness (most/all the time within the past week) and feeling unsafe in local area (unsafe/very unsafe). We were interested in feelings of safety in local area, since this has been shown to be associated with risk for developing chronic conditions and may reflect (1) anxiety disorders (ie, emotional states not necessarily related to actual unsafe conditions) and (2) actual neighbourhood deprivation, such as crime and possibilities for becoming a victim of assault or other offences.[20] Social functioning outcomes included lack of social interaction with friends, relatives, colleagues (interacting never/less than monthly); social isolation (no close ties); social distrust (three lowest social trust categories); respondent ever divorced or had civil union dissolved. Since companionship through marriage is a well-known predictor of longevity, we were also interested in assessing risks for divorce.[21]

Predictors: financial strain and conflict in the childhood family home

Respondents were asked "please tell me how often you and your family experienced severe financial difficulties when you were growing up?" and "please tell me how often there was serious conflict (eg, tension, verbal arguments or physical violence) between the people living in your household when you were growing up?" Response options for both items were: never; hardly ever; sometimes; often; always. Both variables were coded as present if the respondent had answered 'often' or 'always' to the item. A categorical variable was created, consisting of four categories: (1) no strain, no conflict, (2) strain and no conflict, (3) no strain but conflict, (4) strain and conflict.

Potential mediator: adulthood socioeconomic disadvantage

Adulthood SED was assessed by constructing a variable based on education, occupation and current financial strain. Education was classified in seven categories according to the International Standard Classification of Education: (1) less than lower secondary, (2) lower secondary, (3) lower tier upper secondary, (4) upper tier

upper secondary, (5) advanced vocational, subdegree, (6) lower tertiary education, BA-level, (7) higher tertiary education, ≥MA-level. For occupation, unemployed individuals were categorised in the lowest category, and nine additional categories followed according to the International Standard Classification of Occupations. The resulting variable was as follows: (1) unemployed, (2) elementary occupations, (3) plant and machine operators and assemblers, (4) craft and related trade workers, (5) skilled agricultural, forestry and fishery workers, (6) services and sales workers, (7) clerical support workers, (8) technicians and associate professionals, (9) professionals, (10) higher administrator occupations. If respondents were currently unemployed, they were asked about their last paid job. Respondents were thus only categorised as unemployed if they did not report any last paid job or did not have a job previously. If they did, they were categorised according to the occupation of their last paid job. The same approach was used for respondents who were students, disabled or retired. We chose this operationalisation since a person may hold a social position based on a previous occupation, even if currently unemployed. If the respondent was living with a partner/spouse, the mean for education/occupation for the two was used. In the case of a respondent or the respondent's partner being a homemaker, the occupation of the spouse was used (ie, the person not being a homemaker). Current financial strain was assessed by asking how the respondent 'felt about his/her household's income nowadays?', with response options being: (1) finding it very difficult on present income, (2) finding it difficult on present income, (3) coping on present income, (4) living comfortably on present income. In order to generate a single variable for adulthood SED, we used a similar strategy as the one used by York Cornwell and Waite[22] by first reversing all three variables so they ranged from high to low (education, occupation, current financial strain), then standardised them by converting each into z-scores, and finally averaging all three metrics. The resulting adulthood SED scale thus ranged from −1.79 to 2.55, with higher scores indicating more adulthood SED.

Covariates

Demographic characteristics included sex, age, parental occupation and education.[23 24] Parental education was assessed by asking respondents about the mother's and father's education, which were both categorised according to the same international classification as for the respondent. If both mother's and father's education were reported, the mean was used. If only one was reported, only the reported one was used. Parental occupation was assessed by asking respondents about mother's and father's occupation at the time the respondent was 14 years of age. Responses were categorised as follows: (1) unemployed, (2) farm worker, (3) unskilled worker, (4) semi-skilled worker, (5) skilled worker, (6) service and sales occupations, (7) clerical occupations, (8) professional and technical occupations, (9) higher administrator occupations. The procedure as above using the International Standard Classification of Education was also used as for parental education. Because 16.9% of parental education data and 2.1% of parental occupation data were missing, a missing category was created for these two variables. Finally, country was classified into 19 categories for all the individual countries.

Statistical analysis

The statistical analysis was done with Stata V.13.1 (StataCorp, College Station, Texas, USA). A descriptive analysis (including analysis of variance testing) was conducted to demonstrate the characteristics of the sample. These analyses included unweighted frequencies, and weighted proportions, means and SD. Multivariable regression analyses were conducted to assess the associations between childhood family conditions and all outcomes.

Age and adulthood SED were included as continuous variables, while country, gender, and parental education/occupation were included as categorical variables. To assess the role of adulthood SED in the association between these aspect of CA (conflict and/or financial strain) and all outcomes, a mediational analysis was performed using the Karlson Holm Breen (khb) command in Stata.[25 26] This decomposes the total effect of a variable into direct and indirect (ie, mediational) effects. The total effect is the association between the predictor and outcome (not adjusted for the mediator), the direct effect is the association between the predictor and outcome (adjusted for the mediator) and the indirect effect is the difference between the two in terms of log odds. This method allows for the calculation of the mediated percentage, which is interpreted as the percentage of the total effect that can be explained by the mediator (indirect effect/ total effect).

Data from different countries were pooled in order to generate enough power to detect statistical significance (total n=35 475). In the analysis where the outcome was divorce (the respondent ever having had a divorce, or a civil union dissolved), the sample was restricted to respondents who were not in the category 'never been married or in a legally registered civil union' (ie, sample restricted to n=24 796). In all analyses, weights to adjust for different selection probabilities, sampling error, non-response bias and population size were taken into account to generate nationally representative estimates using the Stata svy command. Results are expressed as OR coefficients and 95% CIs. A p value<0.05 was considered to be statistically significant. Information about missing data can be found in the online supplemental appendix 1.

RESULTS

Table 2 shows the characteristics of the study sample. The average age of the analytical sample was 47.6 (SD=18.9) years, and 51.5% were females. The majority of participants, that is, 77.4% reported not having experienced either aspect of CA, while 10.5% reported having

Table 2 Characteristics of the study sample

Characteristic	Category	N	Weighted %
Total participants		35 475	
Sex	Female	18 766	51.5
Age (years)	Mean (SD)	47.6 (18.9)	
Education	ISCED I, less than lower secondary	3811	12.7
	ISCED II, lower secondary	6338	21.1
	ISCED IIIb, lower tier upper secondary	6111	20.6
	ISCED IIIa, upper tier upper secondary	5959	13.2
	ISCED IV, advanced vocational, subdegree	4944	12.5
	ISCED V1, lower tertiary education, BA-level	3852	8.3
	ISCED V2, higher tertiary education, ≥MA-level	4238	11.7
Occupation	Unemployed or homemaker	648	2.3
	Elementary occupations	3332	10.8
	Plant and machine operators and assemblers	2491	7.5
	Craft and related trade workers	3739	11.2
	Skilled agricultural, forestry and fishery workers	1044	3.4
	Services and sales workers	5546	16.9
	Clerical support workers	2829	9.6
	Technicians and associate professionals	4792	15.7
	Professionals	6036	15.8
	Higher administrator occupations	2503	6.9
Financial strain	Very difficult on present income	1642	3.7
	Difficult on present income	5448	14.9
	Coping on present income	16 246	47.8
	Living comfortably on present income	11 862	33.6
Childhood adversity	Strain (–), conflict (–)	26 879	77.4
	Strain (+), conflict (–)	3921	10.5
	Strain (–), conflict (+)	2115	6.7
	Strain (+), conflict (+)	1751	5.3
One or more hampering physical health problems	Present	15 701	46.9
Cancer	Present	1636	3.6
Obesity	Present	5278	15.8
Self-rated health—rated bad or very bad	Present	2739	8.1
Unable to get needed medical consultation	Present	4244	14.6
Current smoker	Present	8404	25.4
Binge drinking—daily/weekly/monthly	Present	9744	26.7
No sport or physical activity within past 7 days	Present	8401	25.5
Fruit and vegetable consumed never/less than weekly	Present	519	1.5
Sedentary behaviour, ie, >3 hours of TV per day	Present	6414	17.7
Depression	Present	6469	18.5
Dissatisfied with life—lowest three life satisfaction categories (0–2 out of 10)	Present	1494	4.4

Continued

Table 2 Continued

Characteristic	Category	N	Weighted %
Unhappy—lowest three happiness categories (0–2 out of 10)	Present	739	1.8
Lonely—most/all of the time within past week	Present	2358	6.8
Feeling unsafe in local area—unsafe/very unsafe	Present	6834	20.1
Lack of social interaction—interacting never/less than monthly	Present	3563	8.3
Social isolation—no close ties	Present	1601	3.8
Social distrust—three lowest social trust categories (0–2 out of 10)	Present	1829	5.8
Respondent ever divorced*	Present	5701	20.3

Sampling weights were used for the calculation of proportions and means (SD).
*The sample was restricted to respondents who was not in the category 'never been married or in a legally registered civil union' (ie, sample restricted to n=24 796).

experienced financial strain only, 6.7% reported having experienced conflict only and 5.3% reported having experienced both. The prevalence of CA overall by age groups (see the online supplemental appendix 1) was similar, but financial strain was reported more among older age groups and conflict more among younger age groups. The mean adulthood SED by CA groups were as follows (note that higher scores represent more disadvantage): no strain, no conflict M=−0.07, SD=0.74; strain and no conflict M=0.39, SD=0.78, no strain but conflict M=−0.08, SD=0.74, 4); strain and conflict M=0.36, SD=0.83. All means were significantly different from each other (p<0.001), with two exceptions: the mean for the conflict-only group was not significantly different from the mean for the no strain and no conflict group (p=0.973), and the mean for the strain and conflict group was not significantly different from the strain but no conflict group (p=0.593).

The remaining tables show the association between both types of CA and general health outcomes and access to healthcare (table 3), health behaviours (table 4), mental health (table 5) and social functioning (table 6). Across all outcomes, with the exception of cancer and binge drinking, reporting either financial strain or conflict during childhood was associated with significant increased risk as compared to not reporting these CAs, and reporting both financial strain and conflict in childhood was associated with the highest risk.

For most outcomes, all three CA groups were associated with significant risk. In some cases, conflict was a significant predictor only when combined with financial strain, suggesting that financial strain was the primary driver (ie, obesity; no sport or physical activity; sedentary behaviour; lack of social interaction; social isolation). In one case, financial strain was significant only in combination with conflict, suggesting that conflict was the primary driver (ie, divorce). In the specific case of cancer as the outcome, only the combined category (reporting both financial strain and conflict in childhood) was significantly associated with increased risk as compared with no CA.

Adulthood SED was a consistent mediator of associations between financial strain alone and combined strain/conflict, for all outcomes with the exceptions of cancer and binge drinking. These mediated percentages ranged from small (eg, 8%–9.5% for hampering physical health conditions), to substantial (eg, 27.9%–67.5% for dissatisfied with life). Adulthood SED was not a significant mediator in the associations between conflict alone and any of the outcomes.

DISCUSSION

Overall, our results confirm our first hypothesis that individuals who report having experienced either financial strain or conflict in the childhood home are at increased risk of having problems in a wide range of areas, that is, physical health, health behaviors, mental health and social functioning. These outcomes are likely to accumulate and exacerbate each other over time, resulting in a 'perfect storm' of health and social problems. Unless buffered by protective factors or interrupted through interventions, the accumulation of these problems is likely to negatively impact quality of life and create multiple, complex, costly care needs. The incremental risk of health and social functioning problems associated with family conflict and/or financial strain during childhood is critically important in terms of disease burden, because these types of CA were reported by about a quarter of the European population. Our results also confirm our second hypothesis, showing a clear dose-response pattern with increased risk of almost all health and social functioning outcomes for each level of both aspects of CA. In all analyses, we adjusted for parental occupation and education, that is, our results persisted regardless of parental social class. Confirming (partly)

Table 3 Logistic regression analyses predicting general health outcomes and access to healthcare by childhood adversity (financial strain/conflict) with adult socioeconomic disadvantage as the mediating variable (*khb* method)

	Total		Direct		Indirect		
	OR	95% CI	OR	95% CI	OR	95% CI	Mediated %
	One or more hampering physical health problems (out of 11 health problems)						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.83**	1.63 to 2.06	**1.73**	1.54 to 1.95	**1.06**	1.04 to 1.08	9.5
Strain (–), conflict (+)	**1.69**	1.46 to 1.95	**1.67**	1.44 to 1.92	1.02	0.997 to 1.03	
Strain (+), conflict (+)	**2.09**	1.77 to 2.47	**1.97**	1.66 to 2.33	**1.06**	1.04 to 1.08	8.0
	Cancer						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	1.20	0.94 to 1.52	1.12	0.88 to 1.42	1.07	1.02 to 1.12	
Strain (–), conflict (+)	1.22	0.84 to 1.76	1.20	0.83 to 1.73	1.02	.99 to 1.04	
Strain (+), conflict (+)	**1.50**	1.03 to 2.17	1.40	0.96 to 2.04	**1.07**	1.03 to 1.12	17.5
	Obesity						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.19**	1.02 to 1.38	1.09	0.93 to 1.26	**1.09**	1.06 to 1.13	52.5
Strain (–), conflict (+)	0.99	0.81 to 1.22	0.97	0.79 to 1.19	1.02	0.995 to 1.05	
Strain (+), conflict (+)	**1.55**	1.26 to 1.90	**1.41**	1.15 to 1.74	**1.09**	1.06 to 1.13	20.5
	Self-rated health—rated bad or very bad						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.76**	1.48 to 2.10	**1.44**	1.21 to 1.72	**1.22**	1.14 to 1.31	35.7
Strain (–), conflict (+)	**2.65**	2.06 to 3.41	**2.52**	1.96 to 3.24	1.05	0.99 to 1.12	
Strain (+), conflict (+)	**3.18**	2.49 to 4.05	**2.58**	2.02 to 3.29	**1.23**	1.15 to 1.32	18.1
	Unable to get needed medical consultation or treatment within the past 12 months						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.86**	1.59 to 2.18	**1.80**	1.54 to 2.11	**1.03**	1.01 to 1.06	5.4
Strain (–), conflict (+)	**2.06**	1.73 to 2.45	**2.05**	1.72 to 2.45	1.01	0.997 to 1.02	
Strain (+), conflict (+)	**2.33**	1.91 to 2.84	**2.25**	1.84 to 2.75	**1.03**	1.01 to 1.06	4.1

Note on the *khb* method: the total effect is the association between the predictor and outcome (not adjusted for the mediator), the direct effect is the association between the predictor and outcome (adjusted for the mediator), and the indirect effect is the difference between the two in terms of log odds. The mediated percentage is the proportion of the total effect that can be explained by the mediator (indirect effect/total effect).
Results in bold are statistically significant (p<0.05). All models adjusted for age, gender, parental occupation and education and country.
Mediated percentage provided only in presence of significant total effect (p<0.05).
khb, Karlson Holm Breen.

our third hypothesis, adulthood SED served as a mediator in associations between financial strain and the outcomes. Notably, adulthood SED was *not* a mediator between family conflict and any of the outcomes. Adulthood SED was a mediator for combined financial strain and conflict, but the mediated percentage was generally attenuated as compared to the mediated percentage for financial strain only, suggesting that the mediation is accounted for by financial strain.

Strengths and limitations

The strengths of the study include the large sample size, the use of nationally representative data from a multinational European survey, and a mediation analysis to take into account the role of adulthood SED. However, several limitations deserve mention. First, these findings were based on self-reported data, which implies the possibility of self-report bias. Second, response rates ranged from 31.4% to 68.9%, and lack of participation in the survey

Table 4 Logistic regression analyses predicting health behaviour outcomes by childhood adversity (financial strain/conflict) with adult socioeconomic disadvantage as the mediating variable (*khb* method)

	Total		Direct		Indirect		
	OR	95% CI	OR	95% CI	OR	95% CI	Mediated %
	Current smoker						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.32**	1.16 to 1.51	**1.16**	1.02 to 1.33	**1.14**	1.09 to 1.19	46.4
Strain (–), conflict (+)	**1.96**	1.67 to 2.29	**1.89**	1.62 to 2.21	1.03	0.99 to 1.08	
Strain (+), conflict (+)	**2.11**	1.78 to 2.50	**1.84**	1.55 to 2.19	**1.14**	1.10 to 1.19	18.1
	Binge drinking—daily/weekly/monthly						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	0.88	0.77 to 1.02	1.22	1.04 to 1.43	1.16	0.96 to 1.40	
Strain (–), conflict (+)	**1.22**	1.04 to 1.43	1.23	1.05 to 1.44	0.99	0.98 to 1.00	
Strain (+), conflict (+)	1.16	0.96 to 1.40	1.20	0.997 to 1.45	0.97	0.95 to 0.98	
	No sport or physical activity within past 7 days						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.28**	1.13 to 1.46	1.13	0.996 to 1.29	**1.13**	1.09 to 1.18	49.5
Strain (–), conflict (+)	1.14	0.95 to 1.37	1.11	0.92 to 1.33	1.03	0.995 to 1.07	
Strain (+), conflict (+)	**1.20**	1.00 to 1.45	1.06	0.88 to 1.27	**1.13**	1.09 to 1.18	67.9
	Poor diet—fruit and vegetable consumption never/less than weekly						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.65**	1.04 to 2.63	1.37	0.86 to 2.19	**1.21**	1.11 to 1.31	37.2
Strain (–), conflict (+)	**3.03**	1.88 to 4.87	**2.88**	1.79 to 4.64	1.05	0.99 to 1.11	
Strain (+), conflict (+)	**2.59**	1.58 to 4.25	**2.14**	1.30 to 3.51	**1.21**	1.11 to 1.32	20.3
	Sedentary behaviour—>3 hours of TV watching per day on average						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.26**	1.10 to 1.45	1.07	0.93 to 1.24	**1.17**	1.11 to 1.23	69.0
Strain (–), conflict (+)	1.11	0.91 to 1.36	1.07	0.87 to 1.30	1.04	0.99 to 1.09	
Strain (+), conflict (+)	**1.51**	1.23 to 1.86	**1.28**	1.05 to 1.58	**1.18**	1.12 to 1.24	39.6

Note on the *khb* method: the total effect is the association between the predictor and outcome (not adjusted for the mediator), the direct effect is the association between the predictor and outcome (adjusted for the mediator) and the indirect effect is the difference between the two in terms of log odds. The mediated percentage is the proportion of the total effect that can be explained by the mediator (indirect effect/total effect).
Results in bold are statistically significant (p<0.05). All models adjusted for age, gender, parental occupation and education and country.
Mediation analysis was only performed when the total effect was significant.
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could limit representativeness. Although we used weights to account for non-response, we cannot rule out some degree of bias introduced by missing data and lack of participation in the individual countries. Third, the two items used to generate our CA predictor variable used a relatively loose definition of childhood (ie, "When you were growing up"), which may not be understood exactly the same by all the participants, and could affect the reporting of CA. Fourth, history of family conflict and financial strain in childhood were based on retrospetive recall. In some age groups and some countries, a considerable discrepancy has been observed between reported and recorded family conflict.[27] In our data, there was a tendency to report more financial strain among older age groups (45+) and more family conflict among younger age groups (prevalence rates of CA by age groups are shown in the online supplemental appendix 1). This likely reflects a cohort effect due to differences in culture

Table 5 Logistic regression analyses predicting mental health outcomes by childhood adversity (financial strain/conflict) with adult socioeconomic disadvantage as the mediating variable (*khb* method)

	Total		Direct		Indirect		
	OR	95% CI	OR	95% CI	OR	95% CI	Mediated %
	Depression						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**2.04**	1.78 to 2.34	**1.65**	1.44 to 1.89	**1.24**	1.16 to 1.32	29.8
Strain (–), conflict (+)	**2.70**	2.30 to 3.18	**2.56**	2.17 to 3.01	1.06	0.99 to 1.13	
Strain (+), conflict (+)	**3.39**	2.82 to 4.07	**2.72**	2.27 to 3.27	**1.25**	1.17 to 1.33	18.0
	Dissatisfied with life—lowest three life satisfaction categories						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.53**	1.21 to 1.95	1.15	0.90 to 1.46	**1.33**	1.21 to 1.47	67.5
Strain (–), conflict (+)	**1.75**	1.21 to 2.54	**1.63**	1.12 to 2.36	1.08	0.99 to 1.18	
Strain (+), conflict (+)	**2.91**	2.16 to 3.92	**2.16**	1.60 to 2.91	**1.35**	1.22 to 1.48	27.9
	Unhappy—lowest three happiness categories						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**2.27**	1.66 to 3.10	**1.60**	1.17 to 2.19	**1.42**	1.26 to 1.60	42.7
Strain (–), conflict (+)	**2.82**	1.83 to 4.35	**2.58**	1.67 to 3.98	1.09	0.98 to 1.21	
Strain (+), conflict (+)	**4.31**	3.03 to 6.11	**3.00**	2.11 to 4.26	**1.44**	1.27 to 1.62	24.8
	Lonely—most/all of the time within past week						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**2.10**	1.73 to 2.54	**1.69**	1.39 to 2.05	**1.24**	1.16 to 1.34	29.4
Strain (–), conflict (+)	**2.62**	2.02 to 3.38	**2.47**	1.91 to 3.20	1.06	0.99 to 1.13	
Strain (+), conflict (+)	**3.28**	2.57 to 4.19	**2.62**	2.05 to 3.34	**1.25**	1.17 to 1.35	19.1
	Feeling unsafe in local area—unsafe/very unsafe						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.49**	1.290 to 1.73	**1.29**	1.11 to 1.50	**1.16**	1.10 to 1.21	36.4
Strain (–), conflict (+)	**1.37**	1.14 to 1.64	**1.32**	1.10 to 1.58	1.04	0.99 to 1.08	
Strain (+), conflict (+)	**1.56**	1.28 to 1.89	**1.34**	1.11 to 1.66	**1.16**	1.11 to 1.22	33.7

Note on the *khb* method: the total effect is the association between the predictor and outcome (not adjusted for the mediator), the direct effect is the association between the predictor and outcome (adjusted for the mediator) and the indirect effect is the difference between the two in terms of log odds. The mediated percentage is the proportion of the total effect that can be explained by the mediator (indirect effect/total effect).
Results in bold are statistically significant (p<0.05). All models adjusted for age, gender, parental occupation and education and country.
Mediation analysis was only performed when the total effect was significant.
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and economic conditions in Europe at different points rather than recall bias. Changes in reported prevalence of conflict may reflect a change in attitudes as to what is acceptable behaviour in the context of family life, rather than an increase in actual prevalence. Further, children who grow up in households with much conflict may have different views on what constitutes conflict compared with those who do not experience conflict, and as such, may underreport. Also, those who experience conflict early during childhood when the conflict is subsequently resolved (eg, by parental separation) may not remember the adverse environment and therefore not report it as occurring often or always. In some cases (depending on the type of adversity and context), very early experiences are likely to be the most long-lasting in terms of impact on the developing emotional and social brain. Finally and importantly, our analyses only capture two aspects of childhood adversity, and these were examined as

Table 6 Logistic regression analyses predicting social functioning outcomes by childhood adversity (financial strain/conflict) with adult socioeconomic disadvantage as the mediating variable (*khb* method)

	Total		Direct		Indirect		
	OR	95% CI	OR	95% CI	OR	95% CI	Mediated %
	Lack of social interaction with friends, relatives, colleagues—interacting never/less than monthly						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.29**	1.09 to 1.54	1.15	0.97 to 1.37	**1.12**	1.08 to 1.17	45.1
Strain (–), conflict (+)	1.18	0.870 to 1.600	1.14	0.84 to 1.55	1.03	0.99 to 1.07	
Strain (+), conflict (+)	**1.82**	1.42 to 2.33	**1.61**	1.26 to 2.07	**1.13**	1.08 to 1.18	20.0
	Social isolation—no close ties						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.33**	1.04 to 1.69	1.08	0.85 to 1.38	**1.23**	1.14 to 1.32	72.4
Strain (–), conflict (+)	1.46	0.900 to 2.37	1.39	0.85 to 2.25	1.05	0.99 to 1.12	
Strain (+), conflict (+)	**1.76**	1.24 to 2.50	**1.43**	1.004 to 2.03	**1.23**	1.15 to 1.32	37.0
	Social distrust—three lowest social trust categories						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	**1.61**	1.29 to 2.01	**1.37**	1.09 to 1.71	**1.18**	1.11 to 1.25	34.2
Strain (–), conflict (+)	**1.84**	1.34 to 2.53	**1.77**	1.29 to 2.43	1.04	0.99 to 1.10	
Strain (+), conflict (+)	**2.78**	2.07 to 3.72	**2.35**	1.75 to 3.15	**1.18**	1.12 to 1.25	16.3
	Respondent ever divorced or had civil union dissolved*						
Childhood adversity							
Strain (–), conflict (–)	1		1		1		
Strain (+), conflict (–)	1.14	0.98 to 1.34	1.08	0.92 to 1.26	1.06	1.03 to 1.09	
Strain (–), conflict (+)	**1.62**	1.33 to 1.98	**1.60**	1.31 to 1.95	1.02	0.99 to 1.04	
Strain (+), conflict (+)	**2.10**	1.71 to 2.58	**1.95**	1.59 to 2.40	**1.08**	1.04 to 1.11	9.8

Note on the *khb* method: the total effect is the association between the predictor and outcome (not adjusted for the mediator), the direct effect is the association between the predictor and outcome (adjusted for the mediator), and the indirect effect is the difference between the two in terms of log odds. The mediated percentage is the proportion of the total effect that can be explained by the mediator (indirect effect/total effect).
Results in bold are statistically significant (p<0.05). All models adjusted for age, gender, parental occupation and education, and country. Mediation analysis was only performed when the total effect was significant.
*The sample was restricted to respondents who was not in the category 'never been married or in a legally registered civil union' (ie, sample n=24 796).
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dichotomous variables based on reports of frequency of occurrence. Specific episodes of significant conflict can be traumatic and result in long-lasting social disabilities and concomitant health problems, but these might not have been captured. These limitations imply that it is not possible to offer a precise estimate of population attributable risk from these aspects of childhood adversity. Thus, the results we present (eg, an approximately threefold increase in risk for mental health problems, poor self-rated health) can be regarded as conservative estimates.

Contextualisation of findings

Overall, our results show that reports of financial strain or family conflict in childhood are associated with significant increased risk of experiencing a wide range of problems in adulthood, in terms of physical health, health behaviours, mental health and social functioning (with the odds for mental health problems and poor self-rated health being particularly high). While the increased risk associated with all of these outcomes is problematic in and of itself, the development of these outcomes may also reinforce each other over time. For example, people reporting these aspects of CA were more likely to smoke, binge drink, have poor diets and be physically inactive, which may all contribute to higher risks of having health problems later in life, for example, cancer.[7] Our findings suggest a dose-response pattern, where strain alone or conflict alone pose independent risks for problems in adulthood, and the combination of both strain and

conflict is associated with the strongest risk.[4 7] Growing up in a general environment characterised by either financial strain or conflict appears to be enough to carry considerable risks for health and social functioning problems in adulthood, possibly even in the absence of other severe forms of adverse experiences (eg, direct forms of abuse or neglect).[28 29]

In line with previous findings,[16 30] our mediation analysis suggests that adulthood SED partly explains the association between two CA categories (financial strain and combined strain/conflict) and the outcomes of interest. However, the analyses indicate that (apart from four outcomes—obesity, poor life satisfaction, social isolation sedentary behaviour) other factors predominantly account for >50% of the impact of CA—potentially through physiological, psychological or social mechanisms. None of the associations between conflict-only and any of the outcomes was mediated by adulthood SED. This means that the experience of family conflict during childhood is not suggested to indirectly lead to health and social functioning problems in adulthood through increases in adulthood SED. Our results show that the mean adulthood SED for those who reported conflict only is not significantly different from those who reported no experience of CA, while the mean adulthood SED for those who reported financial strain only is significantly higher than those who did not report any CA (indicating chains of disadvantage stemming from childhood, lasting into adulthood).

A clear example of chains of disadvantage can be observed with obesity, where (1) childhood financial strain was a predictor of obesity and (2) adulthood SED explained >50% of the association between financial strain in childhood and obesity. Previous research has shown that lower education is strongly related to obesity in high-income countries,[31] and that poor families do not have the financial capacity to buy healthy and nutritious foods,[11] while such families in some cases have to spend up to 74% of their disposable income in order to meet national (UK) guidelines.[32] Our results further show that reports of financial strain in childhood has implications for sedentary behaviour, poor diet, lack of exercise, all of which to a large extent may be attributed to adulthood SED. Next, the association between financial strain and poor life satisfaction was largely explained by adulthood SED (67.5%). This may not be surprising since concurrent economic conditions have been shown to be strongly related to measures of life satisfaction.[33] We also found that about three-quarters (72.4%) of the relationship between reports of childhood financial strain and social isolation in adulthood could be accounted for by adulthood SED. It is possible that experiencing financial strain in childhood limits the ability of individuals to establish social ties throughout developing adulthood. This may occur as a result of lacking adequate resources (eg, resources necessary to participate in social activities or to access education), which may reduce opportunities for making connections with other people, or lead to social withdrawal (as a strategy to avoid social comparison processes).[34] These mechanisms may continue into adult life and become barriers to social connectedness.

Conflict-only was, in most cases, associated with higher risk of adverse outcomes in adulthood compared with financial strain only. Conflict in the family home may exist on its own or be a product of other health or social problems, such as parental mental health problems / parental substance misuse. Conflict may be particularly problematic, with some research having suggested that conflict experienced in childhood is more detrimental to adult health than economic hardship in the childhood family.[35] There were also some specific outcomes for which conflict alone was the only predictor (binge drinking) or appeared to be the driving predictor (divorce). People who have experienced conflict during childhood or other types of adverse childhood experiences are at increased risk of substance use disorders, likely as a learned coping mechanism.[3] Both financial strain alone and conflict alone were significant predictors of feeling unsafe in one's local area. Since only the association for financial strain was mediated by adulthood SED, it could be that this link is related to actual neighbourhood deprivation, while the link between childhood conflict and feeling unsafe may be explained by states of anxiety and hypervigilance that may not necessarily be related to actual unsafe conditions.

Our results revealed that these aspects of CA are associated with increased risk of poor health outcomes, and increased risk of being unable to obtain a needed medical consultation or treatment within the past year, and this is in line with results reported elsewhere.[36] This implies an increased risk of health problems along with a reduced chance of being treated for them, which would likely result in the worsening of conditions over time. Furthermore, our results show that individuals reporting these aspects of CA are at increased risk of feeling lonely and being socially isolated, which may result from lack of social trust and interaction with other people. According to our results, these aspects of CA also positively predict divorce. Conflict appeared to be the primary driver in terms of predicting divorce, which can perhaps be explained by impaired social and communication skills, lack of trust, and aggression, which may be results of growing up in a household where conflict was part of the environment.[2 4 9 10 12 13] Further, research has shown that people tend to marry people who are similar to themselves with regard to several health indicators,[37] which also implies that people with poor mental health are more likely to marry partners that are similar to themselves in terms of mental health status. During marriage, poorer mental health in particular may translate into increased risk of divorce due to dysfunctional dynamics and marital discord.[38]

Given that a fundamental protective factor against adverse health outcomes and premature mortality is the social support provided either by one's network of friends, relatives, coworkers[39], or a spouse,[21] the greater odds of lacking these protective factors is alarming. It has been shown that on average, being married prolongs life by approximately 2 years for women and 7 years for men.[21] Investigations into the links between marriage, bereavement and death have shown that entering into marriage is associated with a sharp and substantial decrease in the risk of death, and subsequently a sharp increase in mortality risk mainly during the first 6–12 months after a spouse's death.[40] Altogether, individuals reporting these aspects of CA may be at increased risk of developing health and social functioning problems, and their chances of receiving both formal and informal care throughout later life-stages may be considerably reduced.

Implications for policy and practice

It is important to note that in our assessment of the impact of financial strain and family conflict in childhood on adult health and social functioning, we adjusted for parental occupation and level of education, which suggests that health problems in adulthood associated with CA go beyond issues of social inequality in childhood. While financial strain tends to be a characteristic of SED, it is also possible to experience difficulty making ends meet in households characterised by a higher educational level. Economic hardship in childhood may also occur due to factors such as parental lack of competencies in terms of managing finances, or problems such as gambling addiction or compulsive spending.[24] In terms of conflict, it is relevant to note that the original Childhood Adverse Experiences study was conducted on an American sample in San Diego, of which the vast majority of participants were middle-income Caucasians with a college education.[2 4] In other words, adverse childhood experiences can occur across all social classes.

It is necessary to assess, monitor and intervene in households characterised specifically by CA in order to progress towards greater health equality.[11] Reviews have been conducted to evaluate the necessary steps needed to intervene among children and adolescents affected by adversity, particularly early interventions among children and parents/families,[10–12 41 42] programmes to reduce marital conflict,[43 44] initiatives to enhance protective factors and resilience among at-risk groups,[42] community programmes and partnerships,[42] incorporating CA screening in various diagnostic procedures[9 12 42] and the use of trauma-focused cognitive–behavioural therapy in the context of traumatic experiences.[10] Economic interventions and social work/policies to reduce or prevent financial strain are necessary for those affected by it,[12 42] while it should also be noted that for those with both types of adversity, family conflict may be intensified through economic hardship (and vice versa).[12] An issue with regard to interventions for family conflict is identification of families in need. Conflict involving physical violence between spouses may be tolerated by them for very long periods because of the shame involved. And emotional violence, a normal part of family life in many families, is only recently coming to be viewed as unacceptable. Programmes to identify domestic violence are being tested in the context of maternity services, and both health visitors and social services are trained to identify violence manifested as child abuse, especially in deprived families. However, the levels of conflict reported in this study, especially those in more socioeconomically advantaged families, may not come to light until studies such as this succeed in changing social norms about what is and is not acceptable.

Given that our results suggest that adults who have experienced CA are at increased risks of a wide range of health and social functioning problems, it is important for health professionals to incorporate a life-course perspective. Preventive strategies within public health may often address problems in adulthood by considering adult health-related behaviours, loneliness or social isolation for health, but not take into account antecedents from the childhood family home. In order to be most effective, public health strategies need to provide both child-focused and adult-focused interventions. Previous compelling research has similarly emphasised the need for effective intervention throughout the life-course for adults who have experienced CA by focusing on both health and socioeconomic conditions.[16] Our results confirm the need for interventions designed to (1) prevent financial strain and conflict in households, both of which should be given high priority, and (2) address a broad scope of health and social functioning problems (physical health, health behaviours, mental health, social functioning) for those having been affected by CA. Cross-sectoral and cross-discipinary interventions are strongly needed in order to promote and ensure the best conditions for health and well-being for all throughout the life-course. The economic costs of CA in terms of excess healthcare and other services (legal, social, etc.) take a huge toll on government spending,[45 46] and investing appropriately to combat CA will ultimately save societal costs.[11 12 42] Finally, governments could monitor the prevalence of CA in populations and consider reductions in reports of CA a priority in efforts to achieve Sustainable Development Goals.[47]

CONCLUSION

Overall, our results demonstrate that individuals reporting financial strain or conflict in the childhood family home are at increased risk of having problems in a wide range of areas, that is, physical health, health behaviours, mental health and social functioning. This is highly problematic in terms of disease burden, given that a quarter of the European population report having experienced these aspects of CA. We observed a clear

dose-response pattern with increased risk for almost all physical, behavioral, mental and social outcomes for each level of CA. Specifically, either financial strain or conflict in childhood was associated with increased risk as compared with no CA, while the risk was highest for both financial strain and conflict. Adulthood SED was a mediator for financial strain, but not for conflict. In order to address health problems associated with CA, it is not enough to address issues of social inequality. Strategies should comprise a life-course approach to health, which may consist of monitoring CAs and appropriately intervening at different stages in life. Collaborative efforts are needed between medical professionals and mental health and social services, as well as broader cross-disciplinary and cross-sectoral approaches.

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