

# **Adverse childhood experiences and risk behaviours later in life: Evidence from SHARE countries.**

Brugiavini A<sup>1</sup>., Buia R.E<sup>2</sup>., Kovacic, M<sup>3</sup>., and Orso, C.E.<sup>4</sup>

## **Abstract**

In this paper we investigate whether exposure to adverse experiences during childhood such as physical and emotional abuse affects the likelihood of unhealthy habits and separately the insurgency of chronic diseases and disabilities later in life. The novelty of our approach consists in exploiting the recently published data on adverse childhood experiences for 19 SHARE countries, which enables us to account for country-specific heterogeneity and investigate the long-run effects of exposure to adverse early-life circumstances on risk behaviour such as smoking, drinking, overweight and obesity. Our results highlight a significant positive effect of exposure to adverse childhood experiences (ACEs) on the probability of unhealthy lifestyles as well as on the insurgency of chronic diseases and disabilities in the long run.

**Keywords:** Adverse Childhood Experiences, Smoking Behaviour, Heavy drinking, Obesity.

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<sup>1</sup> Department of Economics, Ca' Foscari University of Venice.

<sup>2</sup> Department of Economics, Ca' Foscari University of Venice.

<sup>3</sup> European Commission, Joint Research Centre (JRC); Department of Economics, Ca' Foscari University of Venice.

<sup>4</sup> Department of Economics, University of Verona.

## 1. Introduction

The research based on the Fetal Origin Hypothesis describes the child human capital formation through parental investments before and after birth, given the in-utero circumstances and the pre and postnatal environmental shocks. The literature in this field has been flourishing in recent years (see Almond, Currie, Duque (2018) for a comprehensive overview). The main idea underlying this hypothesis relies on the fact that several health and socio-economic outcomes during the life course may depend on early circumstances. Francesconi and Heckman (2016) stress that the family environment during the early years and parental investments (time and material goods invested in children) are critical determinants of human capital because they shape the individuals' initial stock of skills. The crucial role of family in acquiring both cognitive and non-cognitive skills, the latter related to the socio-emotional dimension, has been emphasized in other seminal studies (see, for instance, Cunha and Heckman (2008); Cunha et al., 2010). Recent contributions have highlighted that measuring parental investment on the child only in terms of financial expenditures could be inadequate. For instance, Carneiro et Ginja (2016) suggest that the importance of financial resources in determining child outcomes has been overvalued in the recent literature compared to the importance of parental care and mentoring. Still, in this sense, the economic literature in the field has generally focused on “positive” investments, using measures/indices that synthesize the time spent by the parents with the children and the frequency and types of activities carried on together.

Rather than on positive investments, in this paper we focus on specific parental (dis)investments in the form of emotional and physical abuse in childhood, namely physical harm from parents and/or persons outside the family and child neglect, and we explore their impact on health-related outcomes later in life. This set of adverse circumstances are commonly included in the epidemiological and psychological literature among the Adverse Childhood Experiences<sup>5</sup> (ACE henceforth). Such a negative experiences may have a strong emotional impact that persists along their entire life course and may influence the individuals' choices and/or behaviours.

An extensive literature has shown a significant association between ACEs and health and health-related behaviours over the life course. However, even though existing studies have broadly investigated this association, most of them are based on samples of small size, generally at national or even regional-community levels, so that the results cannot be scaled up to the population level. This paper investigates whether exposure to adverse experiences during childhood may affect health behaviours across the lifespan, using recent European data from the Survey on Health, Ageing and Retirement (SHARE). The novelty of our approach consists in exploiting the variability across

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<sup>5</sup> See, among others, Finkelhora et al., 2015.

countries and across generations, by using recently published data on ACEs for individuals living in nineteen countries covered by SHARE, and who were born in different birth cohorts (from the 20s to the 70s). This enables us to account for country-specific heterogeneity and investigate the long-run effects of exposure to early-life adverse experiences on a set of (un)healthy behaviours, such as smoking, drinking, overweight and obesity. An additional novel contribution lies in the fact that we can evaluate the impact of adverse early life experiences separately for each parent and for individuals outside household. This is an important aspect because male and female children may internalize differently experiences related to mother and father, leading hence to different impact on adult outcomes.

Looking at the association between ACE and health-related behavior may have important economic and policy implications. From an economic point of view analyzing this relationship is extremely important because health-related behaviours are among the main risk factors that determine the insurgency of most serious diseases, which can compromise the individual health-status, such as cardiovascular diseases, musculoskeletal disorders or various forms of cancer, with significant associated economic and social costs. From a policy perspective, it could be relevant to understand the role played separately by (i) exogenous adverse conditions in childhood and (ii) individual's behaviours during the lifespan in determining the overall health status later in life. To shed light on this, we implement a two-step approach which enable us to identify the part of the health outcome being attributable to individuals' behavior and the remaining one to exogenous circumstances such as early life conditions.

Overall, our findings confirm the negative long-term effects of exposure to ACEs on all the outcomes (risk behaviours) considered. In addition, we observe significant differences in the impact of ACEs across generations, and between European macro regions, especially in terms of alcohol abuse. In additions, early life conditions and individuals' behavior have a significant separate impact on health as measured by the insurgency of chronic diseases and disabilities. This effect is particularly strong in the case of unhealthy dietary habits leading to overweight and obesity.

The paper is organized as follows. Section 2 provides a brief overview of the related literature. In Section 3 we describe the dataset and the variables used in the empirical analysis. Section 4 explains the estimation strategy, while in Section 5 we present the main results separately for each outcome considered. In Section 6 we replicate the main analysis introducing a ACE score instead of single ACE variables, while in Section 7 we explore heterogeneity by conducting subgroup analyses. Finally, Section 8 provides some policy implications by estimating the separate effect of ACE and individuals' risk behavior on a set of health outcomes.

## 2. Related Literature

A growing literature in economics, epidemiology and developmental psychology highlights the importance of adverse early-life circumstances in determining life outcomes. Several studies show a positive association between exposure to adverse events in childhood and poor health outcomes over the life course. For instance, Case et al. (2005) using UK data show that children who experienced poor health have significantly lower educational attainment, poorer health, and lower social status as adults. Similarly, Hayward et al. (2004) focus on the association between early-life condition and mortality, and show that factors which influence men's mortality risk are not strictly based on choices made in adulthood, but are also rooted in childhood social conditions.

Some papers have shown that exposure to ACEs is positively associated with risky behaviours (i.e., smoking and drinking), comorbid conditions and chronic diseases such as cancer in adulthood (see Chang et al., 2019). Moreover, other work have highlighted a positive correlation between early-life adversities and the insurgency of mental health problems later in life. Exposure to ACEs is associated with increased risk of adult mental and behavioral disorders, such as depression, emotional well-being and suicide (Chapman et al., 2004; Anda et al., 1999; Merrick et al., 2017, Buia et al., 2019).

As regard risk behaviours, the medical literature documents the existence of a strong relationship between ACEs and (i) smoking habit, and (ii) alcohol abuse. The majority of these studies rely on US data. For instance, Anda et al. (1999) report that adverse childhood experiences significantly contribute to smoking initiation in adolescence and smoking continuation in adulthood among a sample of adult members of the Kaiser Permanente health maintenance organization in San Diego. In the same vein, using population-based data from five US States, Ford et al. (2011) find that the prevalence of current smoking is higher among adults who reported one or more ACEs and increases progressively as the number of ACEs increases. Other research highlights a strong association between childhood stressors and alcohol abuse. For instance, Dube et al. (2002) have explored the effect of multiple adverse childhood experiences in combination with parental alcohol abuse on the risk of later alcohol abuse. They find a strong and positive association between the number of ACEs and the risk of adult alcohol, regardless of experiencing parental alcoholism in childhood or adolescence. Similarly, Anda et al. (2002) examined the linkage between growing up with alcoholic parents and experiencing adverse childhood experiences and the risk of alcoholism and depression in adulthood. Their findings suggest that respondents with higher ACE scores were more likely to have a personal history of alcoholism. Differently to what had been found by Dube et al. (2002), they show that, among respondents with similar ACE scores, the prevalence of alcoholism was substantially higher among those who had alcohol-abusing parents than among those who did not. Few work have focused on the European context. For instance, Bellis et al. (2014) conduct a retrospective study to

determine the impact of ACEs on adult health behaviours and health outcomes in a relatively deprived and ethnically diverse UK population. In another research, Bellis et al. (2014) look at the effect of ACEs exposure on health-harming behaviours including substance abuse, physical inactivity, and attempted suicide focusing on a sample of young adults living in eight Eastern European countries (Albania, Latvia, Lithuania, Montenegro, Romania, the Russian Federation, the Former Yugoslav Republic of Macedonia, and Turkey). Results from these studies confirm a positive association between experiencing adverse childhood circumstances and substance abuse.

Exposure to traumatic events in childhood is also associated with an increased risk of unhealthy weight control behaviours, which can lead to health problems as overweight and obesity later in life (Isohookana et al., 2016). Several studies have examined this relationship. Gunstad et al. (2006) find that men who reported a history of neglect and emotional abuse during childhood were more likely to be obese in adulthood. Using a sample of black women living in US, Boynton-Jarret et al. (2012) show that early-life sexual and physical abuse was associated with an increased risk of obesity in adulthood. D'Argenio et al. (2009) find that not only sexual or physical abuse but also less severe forms of early-life stress (such as separation from one or both parents or marital conflict between parents) are associated to the development of obesity later in life. Moreover, Rehkopf et al. (2016) use data from the 1979 U.S. National Longitudinal Survey of Youth to test the association between ACEs and adult obesity. Their findings suggest long-term impacts of childhood adverse circumstances on excess of weight measured at age 40.

### **3. Data and Variables**

The individual data employed in this study are drawn from the Survey of Health, Ageing and Retirement in Europe (SHARE). SHARE is a multidisciplinary, longitudinal survey on ageing which focuses on the individuals aged 50+ and their spouses. The survey started in 2004 and takes place every two years. It was first implemented in 11 countries and it extended gradually to cover at present 27 countries (all the European Union countries except for Ireland, plus Israel). The “regular” waves (1-2 and 4 to 6) collected information on the current situation of various aspects of the participants’ lives: accommodation, health, working situation, social network/relations, economic situation/assets, behavioral risks, expectations. In the third and seventh waves, SHARELIFE (2008 and 2017 respectively), respondents were asked to report retrospective information on multiple dimensions of their past (health, health care, accommodation, working career, household situation and performance at school during childhood, number of children, childbearing for women, etc.). It should be observed that the retrospective information collected is particularly detailed, the participants went through their entire life, with particular emphasis on the main events, allowing for a thorough reconstruction of

their life history. In wave 7, a new battery of questions has been introduced, regarding emotional experiences in early life, more specifically, the relationship with the parents and whether the respondents have experienced adverse childhood conditions. The SHARELIFE retrospective interview was applied to all the participants who entered the survey after wave 3 (2008).

What makes SHARE data particularly suited for our purposes is the possibility to link the information on the respondents' current situation to the retrospective childhood/adulthood data. In our study, we consider all respondents that participated in at least one regular SHARE wave (between waves 4 to 6) and in the SHARELIFE interview of Wave 7. We exclude from our sample the individuals who entered the survey before wave 4 because for them we do not have the information regarding adverse early life experiences. The regular waves provide information with respect to the smoking behaviour across the lifespan, and alcohol abuse and obesity in adulthood, as well as the individuals' personal characteristics (age, gender, and education of respondents). From SHARELIFE, we exploit the information on the retrospective childhood conditions, the respondent's household situation and the new data on the quality of parent-child relationship and early-life emotional experiences. We end up with a data set containing individuals from 18 European countries (Austria, Germany, Sweden, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, Czech Republic, Poland, Luxembourg, Hungary, Portugal, Slovenia, Estonia, and Croatia) and Israel.

### **3.1 Adverse Childhood Experiences**

The key explanatory variables in the regression analysis that we illustrate in the sequel are several events that may be considered as adverse early-life experiences. SHARELIFE asks respondents to report information on exposure to child neglect and childhood physical abuse, separately for the mother and for the father. With respect to physical abuse in the family, the questionnaire addresses one item:

- 1. How often did your mother/your father push, grab, shove, throw something at you, slap or hit you? 1. Often 2. Sometimes 3. Rarely 4. Never*

In addition, the survey also collects data on child physical abuse by persons outside the family:

- 2. How often did anybody else physically harm you in any way? 1. Often 2. Sometimes 3. Rarely 4. Never.*

Although different with respect to the items used in the epidemiological research, we believe that a good indicator for child neglect could be derived from the following question:

- 3. How much did your mother/your father (or the woman/man that raised you) understand your problems and worries? 1. A lot 2. Some 3. A little 4. Not at all*

Finally, we also include among the explanatory variables the self-reported quality of the relationship with each of the parents:

4. *How would you rate the relationship with your mother/your father (or the woman/man that raised you)? 1. Excellent 2. Very good 3. Good 4. Fair 5. Poor*

We note that the scales used in reporting these emotional experiences do not point in the same direction for all the questions. More specifically, in questions 1 and 2 a lower score indicates the presence of a negative event, while in questions 3 and 4 a lower score means the opposite. This requires attention in interpreting any descriptive and makes necessary a harmonization procedure before using them in the analysis.

Table 1 presents descriptive statistics of the respondents' answers to these questions, by gender and macro region in Europe.

(Table 1 here)

The median values are generally the same between men and women and across European regions, indicating similar distributions in the occurrence of ACE's. Still some differences deserve attention. All respondents in Eastern Europe (men and women) seem to have experienced better understanding from both mother and father (lower median and mean values of the answers in questions 3) while Israeli are characterized by better relationship with either parents. Individuals in Central Europe report instead, on average, less understanding, more harm from parents and poorer relationship with both mother and father, with respect to the other regions. When comparing the means among genders we observe that women display slightly less physical harm from either parents and from persons outside the family in all the European regions. Still, in Northern and Central Europe they report, on average, less understanding from either parents and poorer relationship with the mothers with respect to male respondents, while the relationship with the fathers are always better for females.

Starting from the above questions, we first need to construct a set of variables that evaluate the exposure to some adverse childhood experience (ACE). For this, we recode the answers into dichotomous variables, where a value of 1 indicates that the individual was exposed to a negative experience in early life. We consider that an individual experienced physical abuse in the family if she/he answers '1. Often' or '2. Sometimes' at question 1, from either the mother or the father. We treated question 2 in the same manner to capture physical harm from other persons. A situation of 'child neglect' corresponds to answers '3. A little' or '4. Not at all' for question 3. The relationship with the mother/father in childhood is rated 1, that is, 'problematic'/negative, if the respondent answers '4. Fair' or '5. Poor' to the last query.

### 3.2 Outcome Variables

In our analysis, we explore the impact of adverse childhood conditions on a specific set of (un)healthy behaviours (determining health levels) – such as smoking, drinking, overweight and obesity across the lifespan.

In evaluating the smoking behaviour, we use information elicited from regular SHARE waves. We consider two variables. On the one hand, in order to evaluate the impact that ACEs may have on the probability to start smoking, we use a *dummy* indicating whether the respondent has ever smoked on a daily basis throughout his/her life. On the other hand, for an analysis along an intensive line, for those individuals who report to be current smokers or to have ever smoked on a daily basis, we consider a variable that records the number of years of smoking. About 44% of the respondents in our sample report to have smoked on a daily basis in their life. The percentage of ever-smoking men is nearly 57%, while for women it is about 34%. If we focus on the intensity of smoking in terms of the number of years an individual declares to have smoked, men tend to smoke for longer periods (with an average of 27 years) compared to women (23 years). These outcomes are unconditional and may depend on age and cohort, still the differences are quite remarkable: the econometric analysis below is an attempt to unravel the role of the different variables.

As for alcohol abuse, we create a dummy variable to measure the intensity and the frequency respondents drink alcoholic beverages in adulthood. More specifically, we consider the following question (available in the regular SHARE waves): “*In the last three months, how often did you have six or more units of alcoholic beverages on one occasion? 1. Daily or almost daily; 2. Five or six days a week; 3. Three or four days a week; 4. Once or twice a week; 5. Once or twice a month; 6. Less than once a month; 7. Not at all in the last 3 months*”. The heavy drinking dummy will assume value 1 if respondents declare to have six or more drinks in the same occasion (i) daily or almost daily; (ii) five or six days a week; (iii) three or four days a week; (vi) once or twice a week, and 0 in all the other cases. About 12% of the respondents in our sample can be considered as heavy drinkers according to the previous definition. This proportion differed among men and women: rates of self-reported heavy drinking were about 18.4% for men and 6.3% for women.

We measure adult overweight and obesity using information on body mass index (BMI) elicited in the regular waves of SHARE. We use BMI as a proxy for an unhealthy diet. BMI is calculated as body weight in kilograms divided by the square of body height in meters (kg/m<sup>2</sup>). In line with the World Health Organization definition of overweight and obesity, we consider that an individual is obese if having a BMI equal to or higher than 30 while a person is overweight when her/his BMI is equal to or higher than 25. In order to evaluate the impact that ACEs may have on the probability to be overweight or obese later in life, we first use a dummy indicating whether the



respondent has a BMI equal to or higher than 25, and 0 otherwise. Overweight and obese account for 65.68% of our sample. More men than women are overweight or obese (70.3% versus 62.19%). These percentages reflect recent European statistics<sup>6</sup>, confirming a high prevalence of overweight and obesity especially among adult people. Second, we focus on the more severe form of overweight, i.e. obesity, by creating a dummy variable that takes value 1 in case an individual has a BMI equal to or higher than 30 and 0 otherwise. About 24.5% of the overall sample is at risk of obesity, while this percentage slightly differs across genders (men 23.47%; women 25.41%).

Table 2 describes the prevalence of the smoking, heavy drinking, overweight and obesity separately for each of the adverse childhood experiences that we include in our analysis.

(Table 2 here)

The percentages indicate a higher prevalence of smoking and obesity for each of the ACEs considered. In the case of heavy drinking and overweight, the incidence is larger among the individuals who have been exposed to harm from either parents while there are not significant differences between those that have and those that have not experienced little understanding or poor relationship with their parents.

The birth cohort represents another source of variability in our data. Table 3 presents the prevalence of risky behaviours by generation (silent generation, baby-boomers and X-generation) while table 4 shows the frequencies of smoking behavior by cohort, for individuals that experienced ACEs versus those not exposed to adverse circumstances in early life.

(Tables 3 and 4 here)

In particular, the cohort of individuals born between 1940-1944 displays much larger percentages of smokers for those exposed to harm from others. Moreover, very large differences between exposed and non-exposed can be observed also for the youngest generations, which would support the hypothesis that “smoke” is linked to “self-medicating efforts to cope with negative effects of adverse childhood experiences” (Anda et al.1999).

The interpretation of the above descriptives however requires some caution. Indeed, there may be a selection bias since the oldest cohorts in our sample contain individuals with better health prospects and, hence, with longer life expectancy.

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<sup>6</sup> See: [https://ec.europa.eu/eurostat/statistics-explained/index.php/Overweight\\_and\\_obesity\\_-\\_BMI\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php/Overweight_and_obesity_-_BMI_statistics)

### 3.4 Other Controls

In addition to adverse childhood experience variables, we control for a rich set of information on SES in childhood, namely, the occupational status of the respondent's father (employed or not), the number of books at home, the number of rooms at home, the household size, the occupation of the main breadwinner (white/blue collar) and the childhood health status when the respondent was 10. As for the number of books at home, we generate a dummy indicator equal to 1 if the respondent reports to have had more than 100 books at home when he/she was 10 years old, and 0 otherwise. Concerning childhood self-assessed health (SAH), SHARE asks the following question: "Would you say that your health during your childhood was in general excellent, very good, good, fair, or poor?". SAH was therefore measured on a five-point scale from "excellent" (score 5) to "poor" (score 1) and treated as an ordered categorical variable. We have dichotomized the SAH into a binary variable assuming value 1 if individuals declare that their health during childhood was excellent, very good, good, and 0 otherwise. In addition, we include a dummy variable assigning value 1 if the respondent's family moved due to financial hardship during his/her childhood.

Along with childhood characteristics, we also include information on the level of education of respondents and their parents, respectively. More precisely, we generate three distinct dummy variables that take value 1 in case of high school completion, and 0 otherwise.

To capture possible long-run trends in our outcome variables, we further consider a set of indicators for the birth cohort. Since the view of smoking or drinking as a negative health behaviour may have differed substantially between younger and older cohorts, we distinguish among three generations: the "Silent Generation" (born 1926–1945), the "Baby Boomers" (born 1946–1965), and the "X Generation" (born 1966–1980) (Di Novi et al., 2019). In addition, to control for a potential business cycle effect that operates through economic conditions, we consider in all specifications a dummy indicator for having experienced at least one episode of recession (defined as three consecutive years of negative growth of GDP)<sup>7</sup> during the age period from 1 to 17, which coincides with the reference period for reporting ACEs. Finally, to account for unobserved country-specific effects, in all regressions we include country dummies.

## 4. Empirical Strategy

In order to investigate the association between adverse circumstances in childhood and each of the adult outcomes described in Section 3.2, we run a set of probit models. Each of them is first estimated

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<sup>7</sup> See Brugiavini et al. (2014).

using the entire sample, and then separately by gender. More specifically, we estimate the following equation:

$$y_i = \alpha + \beta_1 ACE_i + \beta_2 X_i + \gamma_b + \delta_c + \vartheta_c + \varepsilon_i \quad (1)$$

where the dependent variable  $y$  is a dummy indicator describing the outcome of interest for the  $i$ -th respondent, namely the probability of smoking across the lifespan, the probability of abusing alcohol, or being overweight/obese later in life.  $ACE_i$  consists in a set of dummy variables (or, in a separate specification, a single index), indicating exposure to adverse childhood experiences at any age during childhood or adolescence (ages 0-17).  $X_i$  is a vector of other control variables: childhood characteristics and education of respondents and their parents,  $\gamma_b$  is a generation fixed effect,  $\vartheta_c$  is a recession fixed effect,  $\delta_c$  is a fixed effect for the country of current residence, and  $\varepsilon_i$  is the error term.

As for the smoking habit, we additionally restrict our sample to individuals who report to be current smokers or to have ever smoked on a daily basis, and estimate a set of OLS regressions using as dependent variable the total number of years of smoking. With respect to Model (1), in this specification we add among the control variables also the respondents' age.

## 5. Results

### 5.1 Smoking and Heavy Drinking

In what follows, we present the results of our main specifications. Table 5 shows the results for the probability of having ever smoked daily and for alcohol misuse.

(Table 5 here)

All the coefficients are reported as marginal effects. In general, our findings highlight a significant and positive relationship between adverse childhood experiences and the probability of smoking daily at some point in adulthood. In particular, exposure to child physical abuse and poor relationship with parents are positively and significantly associated with the probability of having ever smoked daily, while having experienced physical harm from persons outside the family does not significantly affect smoking behavior later in life. It is important to observe the differences between genders. Having experienced harm from the mother has a more important effect for men but physical abuse from the father increases more the probability of smoking for women; for men the marginal coefficient in this case is positive but it is not significant. Emotional neglect from the mother (“understanding mother”) appears as a strong and significant predictor of the probability of smoking daily for both genders, while experiences of neglect from the father does not significantly correlate

with smoking habits. A poor relationship with the mother increases by about 3% the probability of smoking daily for females but is not significant for men. The relationship with the father, instead has a similar impact on both genders, increasing by about 3% the probability of smoking daily for women, and by about 4% for men.

As for alcohol misuse, among the different ACEs, physical abuse is positively and significantly associated with the probability of heavy drinking. In particular, physical harm from the mother is strongly significant in all specifications, while the magnitude of this effect is larger for men than for women. Having experienced physical abuse from mother increases the probability of alcohol abuse later in life by 1.9% for women and by 2.8% for men. In the case of physical harm from father, the relationship displays similar patterns: positive sign for both genders and larger impact for men but it is less significant (only at 10% level versus 1% level in the case of harm from mothers), when running the regressions separately by gender.

Table 6 shows the results for the number of years a respondent reports to have been smoking or to have smoked in the past.

(Table 6 here)

Again, we find a significant and positive relationship between adverse childhood experiences and the total years of smoking, with important differences between genders and among types of ACEs. Exposure to physical harm (either from mother, from father or from persons outside the family) significantly increases the number of years of smoking among smoking women, while the effect is much smaller and less strong (harm from father) or not significant (harm from mother/other) for the men subsample. Putting together with the results from table 5 it is interesting to note that, while physical abuse from mother is not significantly associated to the females' probability to smoke, among smoking women, having experienced harm from mother has a strong impact on the intensity (number of years) of smoking. We can observe similar patterns (that is, not significant effect on the probability of smoking but positive significant coefficients for the years of smoking) for the physical abuse of others on females and harm from father on males. The issue works somehow vice-versa for men with respect to the physical abuse from mother: this strongly increases the probability to adopt a smoking behaviour (see table 5) but it has a non-significant effect on the years of smoking among smoking males.

It is worth observing that having experienced physical harm from father has a positive and significant impact on the number of smoking years in all specifications, the effect being larger for women.

Going to the other ACEs, except for a mild effect of the child neglect from mother on the men subsample, experiencing child neglect or a poor relationship with either parents does not have a significant impact on the number of years of smoking.

## 5.2 Overweight and Obesity

Table 7 reports the results for the probability of being overweight and obese later in life.

(Table 7 here)

Among ACEs, physical harm from the mother is a strong predictor of overweight and obesity for females. Exposure to physical abuse from mother increases by 3.5% the probability of being overweight and by 1.7% the probability of obesity later in life. Having experienced physical abuse from the father plays an important role in explaining both outcomes for the male subsample. Child neglect variables (“understanding mother” and “understanding father”) do not have a significant effect on the probability to be overweight or obese. By contrast, we find that experiencing a poor relationship with the mother is significantly associated with a decreased risk of obesity for males ( $p=0.01$ ).

## 6. An Index approach to ACEs

Since ACEs tend to be highly interrelated (Anda et al., 1999; Dong et al., 2004; Ford et al., 2011), we sum the number of categories of ACE exposures for each individual to generate an ACE aggregate score (range 0-7). The use of such an indicator as a measure for the exposure to early life trauma is a common practice in the epidemiological literature and several studies have found a positive graded relationship between the ACE score and a large set of health and social dimensions (e.g. Anda et al., 2010).

Reporting at least one ACE is relatively common in our sample: 54.6% reported no ACEs, about 17% report one, 14.4% report two, 7.4% report three, about 4% report four, and 2.6% report five or more. Table 8 shows the marginal coefficients for each risk behaviour considered in the study.

(Table 8 here)

The results indicate a positive and significant relationship between the number of adverse experiences in early life and the smoking behaviour. An additional ACE leads to an average increase of 0.023 in the probability of smoking in adulthood and the magnitude of the effect is almost identical for both men and women. Still, there are some differences in the marginal effects at various ACE scores between genders. Figure 1 shows the average marginal effects for each level of the ACE score, separately for men and women and describes the dissimilarities between them.

(Figure 1 here)

We observe that the average marginal increase in the probability of smoking is always positive for both male and female, indicating a gradual rise in the overall probability of smoking with the number of adverse childhood experiences. But, while for the men the increment in the probability of smoking

is larger for low ACE scores, for women it is bigger the larger the number of ACEs, pointing out that women are more “vulnerable” to the accumulation of adverse events.

Along the intensive line, we observe that the impact of the ACE score on the number of years of smoking is strong and significant for both genders. Still, the effect is much larger for females: an additional adverse event in early life determines an increase of 0.739 in the years of smoking for the smoking women, versus an effect of 0.363 in the case of men.

The results in table 8 also indicate a significant graded relationship between the number of ACEs and alcohol abuse later in life. The impact on the probability of heavy drinking is strongly significant for men but is much smaller and not significant for the female subsample. Figure 2 describes the average marginal effects of the cumulative number of adverse early life experiences on the probability of alcohol abuse in adulthood.

(Figure 2 here)

The graph displays similar trends for men and women. An additional adverse event increases the probability of heavy drinking more than proportionally for both genders but the magnitude of the impact is much larger for men.

As for obesity, we find a positive correlation between the ACE score and the probability to be obese later in life, which is significant in the full and the female specifications. Figure 3 shows the average marginal effects of the number of childhood trauma on the probability to experience obesity in adulthood. We note that the effect of an additional ACE is positive and almost constant always, slightly larger for women (this can be observed better from the plot of the contrast of average effects, which is always positive).

Finally, to complete the analysis, we find no effect when we focus on the number of ACEs a respondent had experienced and the probability of being overweight.

## **7. Heterogeneity Analysis**

In this section we test the robustness of our results by splitting the sample according to three different criteria. First, we estimate our models separately for two distinct generations, namely the “Silent Generation” and the “Baby Boomers”. We exclude the “X Generation” since the corresponding sample size is too small (2.58% of observations). Second, following Mensah and Chen’s (2013) Global Clustering of Countries by Culture, we replicate our analysis for four different clusters of countries, namely: Nordic countries (Sweden, Denmark and Estonia), Germanic countries (Austria, Germany, Switzerland, Belgium and Luxembourg), Latin countries (Italy, Spain, Portugal, France and Israel), and Eastern countries (Croatia, Greece, Poland, Czech Republic, Hungary and Slovenia).

Tables 9 and 10 report the marginal effects of each category of ACE on our main dependent variables when performing the analysis by generation. Table 9 refers to the “Silent Generation” while Table 10 focuses on “Baby Boomers”.

(Tables 9 and 10 here)

We observe some differences in the impact of early life conditions on the smoking and drinking behaviours, between the two generations of individuals. For instance, there is a significant and positive relationship between the exposure to child physical abuse from the mother and the probability of having ever smoked in the case of Baby Boomers while this effect is null and statistically insignificant for silent generation individuals. Similarly, a poor relationship with the mother and/or father significantly increases the probability of smoking for baby Boomers and does not have any effect for Silent generation birth cohorts. Compared to the coefficients from baseline specification (Table 5), Baby Boomers in general result more sensitive to ACEs with respect to older cohorts’ individuals indicating that the overall effect (Model 1, Table 5) is mainly driven by the former birth cohorts.

The difference between generations is less pronounced when analyzing the alcohol abuse, except for having experienced harm from the father, which is statistically significant for the baby boomers and null and insignificant for the Silent Generation. The observed differences in the case of smoking behavior may be due to the fact that smoking has not been widely spread across early birth cohorts while it became a common practice in the 60s and 70s. The probability of being overweighted and obese later in life, on the other hand, does not result significantly associated with ACE for neither generation, when analyzed separately.

Tables 11-14 present the results of our analysis when running the specifications separately by country cluster. The figures reported represent average marginal effects.

(Tables 11-14 here)

Note that the outcomes display some differences between country clusters. In Nordic and Germanic countries, exposure to physical abuse from fathers has a positive and significant impact on the probability of smoking and alcohol abuse while the correlation between harm from mothers and the unhealthy behaviours under analysis is always not significant. Differently, in Latin and East European countries physical abuse from mothers has a positive and significant effect on the probability of alcohol abuse, obesity and smoking. Exposure to child neglect (little understanding) from mother increases the probability of smoking in adulthood in almost all country clusters, except for East Europe, while the impact is much larger in Germanic countries.

## 8. Adverse Childhood Experiences, risky behaviors and health later in life

Risk behaviors such as smoking, drinking or unbalanced diet may have serious consequences on health later in life. When it comes to policy implications, the governments should identify the part of the outcome being attributable to individuals' behavior and the remaining one to exogenous circumstances such as early life conditions. The problem may arise when these two effects are not independent, i.e., the observed behavior (smoking, drinking and bad dietary habits that result in obesity) and ACE are associated one to another up to a certain extent. In this context, the policymaker should hold the individuals with worse lifestyles coming from parental backgrounds characterized by adverse early life conditions "less responsible" than the individuals with the same lifestyles coming from families with favorable childhood experiences. This line of reasoning is coherent with the rich literature on inequality of opportunity in health (Jusot et al., 2013; Trannoy et al., 2010, Brunori et al., 2020, Davillas and Jones, 2020).

In order to assess the relative importance of ACE and health related behavior on individuals' health outcomes we follow the normative principle proposed by Roemer (1998). We first clean the lifestyle variables (smoking, drinking and obesity)<sup>8</sup> from any contamination coming from parental backgrounds by estimating the following empirical model:

$$B_i^m = \gamma + \rho F_i + \varepsilon_i \quad (2)$$

where  $m=\{S, D, O\}$  refers to the individual  $i$ 's type of a lifestyle (S = smoking, D = drinking, O = obesity),  $F_i$  is the vector of family background variables (ACEs, absence of a parent/s, dwelling characteristics), and  $\varepsilon_i$  the error term.

As a next step we substitute the vector of individual choices  $B_i^m$  cleaned from parental backgrounds for the estimated individual lifestyles  $\hat{\varepsilon}$  in the health equation:

$$H_i = \alpha_0 + \alpha_1 F_i + \alpha_2 \hat{\varepsilon} + \alpha_3 D_i + u_i \quad (3)$$

where  $H_i$  stays for the individual  $i$ 's health outcome in adulthood (more than two chronic diseases, more than one limitation with daily activities - ADL, and Global Activity Limitations Indicator - GALI)<sup>9</sup>,  $D_i$  is the vector of socio-economic and demographic controls and  $u_i$  is the error term.

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<sup>8</sup> We consider obesity (BMI > 30) rather than over-weight (BMI > 25) variable as a relevant health outcome related to unhealthy dietary habits since it directly impacts the individuals' daily activity potential and is strictly related to the occurrence of chronic disturbances.

<sup>9</sup> We use three different variables as proxies for the overall health situation of the respondent: (i) a dummy assuming value 1 if she declares to suffer from more than two of the following health conditions: heart problems, high blood pressure, high cholesterol, stroke, diabetes, lung disease, asthma, arthritis, osteoporosis, cancer, ulcer, Parkinson's disease, cataracts, hip or femoral fracture, psychological problems, other; (ii) a dummy assuming value 1 if the respondent reports



Table 15 shows the estimation of equations (2) and (3). Model 1 refers to equation (1), while Models 2-4 report the estimation coefficients for the model specified in (3) for our health outcomes as a dependent variable.

(Table 15 here)

Two important findings emerge from the results. First, nonetheless the effects of ACE remain significant in most cases, the contribution of lifestyles to the variation in individuals' health is relatively larger than the effect of adverse childhood experiences. Second, the effect of binge drinking on health is negative (at least in the model including the global activity limitation index - GALI as a dependent variable) which may seem-counter intuitive since binge drinking episodes are expected to correlate positively with the occurrence of health problems. This result, however, may be partly due to the fact that the distribution of residuals (derived from Model 1, Panel B) is highly skewed (with a skewness and kurtosis equal to 2.3 and 6.3 respectively) which may shape the magnitude and direction of the observed estimated effect. The association of obesity and health, on the other hand, results particularly strong while the effects of ACEs remain roughly the same compared to smoking and drinking habits. This is not a surprising evidence since obesity has an immediate effect on the activity potential of individuals and is strictly related to a variety of chronic disturbances like high blood pressure, diabetes, and cardio-vascular diseases.

The empirical evidence discussed so far may have important policy implications. Healthy lifestyles represent individual efforts that should be remunerated, especially when it comes to healthy dietary habits which strongly reduce the probability of chronic diseases and the occurrence of activity limitations. As for smoking and drinking, on the other hand, the government should encourage the change of unhealthy behavioral attitudes through programs and campaigns aimed at increasing the consciousness about these issues. Least but not last, the policymaker should identify and treat with particular attention the disadvantaged part of the population since these individuals may be considered as less responsible for the observed outcomes with respect to more advantaged individuals. In other words, the governments should find a way to appropriately compensate the individuals for the adverse effects of early life conditions which are certainly out of their control.

The economic cost of unhealthy habits (whether they are a matter of individual choice or are inherited from parental backgrounds through adverse childhood experiences) in terms of health and related expenses may be significant especially for countries characterized by high shares of daily smokers of

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one or more limitations with daily activities such as dressing, eating, bathing, etc.; (iii) a dummy assuming value one if the respondent reports to suffer from some limitations in performing daily activities (GALI).

cigarettes, high frequencies of alcohol consumption and/or higher incidence of obesity in the population. As related to the latter, the health authorities should pay particular attention to shaping the individuals' dietary habits especially among individuals aged 65 – 74 who report the highest incidence of obesity across countries (Eurostat, 2019), which are also among the most vulnerable population categories in terms of health related problems. Moreover, the coexistence of higher incidence of risk behavior and larger shares of health expenditure relative to GDP may represent an additional burden to the overall public finance, which is inefficient from a welfare perspective since these types of risk behavior are among the most important avoidable public health threat.

## **9. Conclusion**

Several studies have explored recently the importance of early life conditions in determining individuals' lifestyles and future health, especially in the epidemiological field. However, most studies are based on rather restricted samples, generally at national or even regional-community levels, which have a very limited generalizability.

In this paper, we exploit recent European data from SHARE to analyze whether exposure to adverse experiences, such as physical abuse and emotional neglect, during childhood may affect several unhealthy risk behaviours, namely smoking, drinking, and unhealthy diet, leading to overweight and obesity. In addition to estimating separately the effects of each ACE on the probability of smoking, heavy drinking and obesity/overweight in adulthood, we also explore the relationship between the cumulative number of childhood adverse events and the above mentioned outcomes. Our results outline a significant and positive impact of experiencing early life trauma on the occurrence of risk behaviour later in life, with some variations in the magnitude of the effects between genders, generations and country-clusters.

In particular, exposure to harm from parents (either mother or father) is associated with a higher probability of smoking and heavy drinking in adulthood while child neglect and a poor relationship with either parents, have a positive impact on the probability of smoking later in life. When using the ACE score as a measure for adverse early life experiences, our results show an incremental relationship between the cumulative number of childhood trauma and the probability of adopting risk behaviours in the long-run. At the intensive margin, we find a positive and significant association between the exposure to physical harm from either parents and the number of years of smoking. A

similar evidence is found for the effect of early life conditions as measured by means of a cumulative number of adverse childhood experiences (ACE score).

Finally, the estimation of a separate effect of early life conditions and individuals' risk behavior on a set of health outcomes later in life suggest that lifestyles, along with ACEs represent a significant correlate to the occurrence of chronic diseases and limitations in a daily life. This is particularly true for individuals experiencing unhealthy dietary habits which result in obesity.

The empirical evidence reported in this paper may have important policy implications. First, child abuse and neglect are serious issues since they can have important and lasting effects on individuals lifestyles and health during the life course entailing a significant individual and social cost. Policymakers should identify and treat with particular attention the disadvantaged part of the population since these individuals may be considered as less responsible for the observed outcomes with respect to more advantaged individuals. This could be done through economic support to families, family friendly work policies or education campaigns. Such problems and interventions have been given increased attention recently in the United States but less have been said about them in Europe, where the existent studies have focused mainly on UK and ex-communist countries. Second, healthy lifestyles represent individual efforts that should be remunerated, especially when it comes to healthy dietary habits which strongly reduce the probability of chronic diseases and the occurrence of activity limitations. As for smoking and drinking the governments should encourage the change of unhealthy behavioral attitudes through programs and campaigns aimed at increasing the consciousness about these issues.

We recognize that this study has some limitations. First, ACEs were retrospectively recalled in adulthood and may have been subject to recall bias and "coloring". In this regards, Havari and Mazzonna (2015) assessed the internal and external consistency of the measures of childhood health and socio-economic status included in SHARELIFE wave 3 and found that overall respondents seem to remember fairly well their childhood conditions. Since the method used to collect retrospective information – the *Life History Calendar* – was applied also in Wave 7, we can plausibly assume that overall respondents remember fairly well their health status and their living conditions between age 0–15. Second, the present analysis allows for future refinements in the sense of considering other potential confounders, such as adult adverse events, which may affect outcomes later in life.

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## TABLES AND FIGURES

Table 1: Summary Statistics, Adverse Childhood Experiences (ACE) variables.

<b>Panel A: Women</b>									
Region	Understanding			Relationship			Harm		
Mother									
	Obs	Median	Mean	Obs	Median	Mean	Obs	Median	Mean
North	5066	2	1,78	5144	2	2,18	5131	4	3,58
Center	7587	2	2,00	7640	2	2,45	7644	4	3,39
South	7655	2	1,75	7668	2	2,09	7644	4	3,41
East	4732	1	1,56	4754	2	2,08	4749	4	3,40
Israel	1080	2	1,97	1108	2	2,09	1104	4	3,46
Father									
	Obs	Median	Mean	Obs	Median	Mean	Obs	Median	Mean
North	4663	2	2,10	4707	2	2,35	4784	4	3,69
Center	7306	2	2,25	7362	3	2,58	7400	4	3,49
South	7472	2	2,02	7488	2	2,31	7503	4	3,60
East	4635	2	1,86	4646	2	2,31	4656	4	3,56
Israel	1037	2	2,11	1073	2	2,14	1078	4	3,47
Other									
	Obs	Median	Mean	Obs	Median	Mean	Obs	Median	Mean
North							5181	4	3,76
Center							7720	4	3,74
South							7716	4	3,84
East							4772	4	3,83
Israel							1117	4	3,60
<b>Panel B: Men</b>									
Region	Understanding			Relationship			Harm		
Mother									
	Obs	Median	Mean	Obs	Median	Mean	Obs	Median	Mean
North	3576	2	1,76	3694	2	2,08	3695	4	3,55
Center	6011	2	1,83	6073	2	2,26	6065	4	3,36

South	5920	2	1,77	5935	2	2,09	5915	4	3,33
East	3407	1	1,55	3423	2	2,10	3419	4	3,33
Israel	793	2	1,94	819	2	1,98	810	4	3,46
Father									
	Obs	Median	Mean	Obs	Median	Mean	Obs	Median	Mean
North	3388	2	2,10	3472	2	2,40	3503	4	3,43
Center	5790	2	2,17	5837	3	2,64	5858	3	3,25
South	5778	2	2,03	5789	2	2,40	5794	4	3,34
East	3341	2	1,80	3353	2	2,38	3361	4	3,26
Israel	764	2	2,14	780	2	2,27	785	4	3,29
Other									
	Obs	Median	Mean	Obs	Median	Mean	Obs	Median	Mean
North							3721	4	3,64
Center							6129	4	3,67
South							5971	4	3,77
East							3446	4	3,76
Israel							821	4	3,50

Table 2: Prevalence of unhealthy/risky behaviours by exposure to ACEs

	Ever smoked	Heavy drink	Overweight/obese	Obese
<b>Harm from mother</b>				
No	44%	11%	64%	23%
Yes	49%	14%	68%	26%
<b>Harm from father</b>				
No	43%	11%	64%	23%
Yes	51%	16%	68%	26%
<b>Harm from others</b>				
No	44%	12%	65%	23%
Yes	52%	14%	65%	26%
<b>No understanding mother</b>				
No	43%	12%	65%	23%
Yes	50%	12%	64%	24%
<b>No understanding father</b>				
No	43%	12%	65%	23%
Yes	48%	13%	64%	24%
<b>Poor rel with mother</b>				
No	44%	12%	65%	23%



Yes	51%	11%	63%	25%
<b>Poor rel with father</b>				
No	43%	12%	65%	23%
Yes	51%	13%	64%	25%

Table 3: Prevalence of risky behaviours by generation and type of ACE

Generation	Harm from mother		Harm from father		Harm from other		No underst mother		No underst father		Poor rel with mother		Poor rel with father	
	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
Ever smoked daily														
Silent gener	35%	40%	35%	44%	36%	44%	35%	41%	35%	38%	36%	40%	35%	41%
Baby boomers	48%	53%	48%	54%	49%	55%	48%	54%	48%	52%	49%	56%	48%	55%
X gener	40%	59%	41%	62%	43%	57%	40%	57%	41%	50%	41%	58%	40%	60%
Heavy Drinking														
Silent gener	8%	10%	8%	11%	8%	10%	8%	8%	8%	8%	8%	7%	8%	8%
Baby boomers	14%	16%	13%	18%	14%	15%	14%	14%	14%	15%	14%	14%	14%	15%
X gener	11%	12%	10%	17%	11%	15%	10%	14%	10%	13%	11%	9%	11%	10%
Obesity														
Silent gener	21%	23%	21%	23%	21%	24%	21%	22%	21%	21%	21%	24%	21%	23%
Baby boomers	24%	28%	24%	27%	25%	26%	25%	25%	25%	25%	25%	25%	25%	25%
X gener	19%	23%	18%	32%	19%	31%	19%	22%	19%	20%	19%	24%	18%	23%

Table 4: Percentage of smoking individuals by cohort and type of ACE (exposed versus non exposed)

Cohort	Harm from mother		Harm from father		Harm from other		No underst mother		No underst father		Poor rel with mother		Poor rel with father	
	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
30-34	30%	34%	30%	35%	31%	29%	29%	37%	31%	30%	30%	36%	30%	34%
35-39	34%	38%	34%	41%	34%	41%	33%	40%	34%	38%	34%	39%	34%	40%
40-44	39%	44%	38%	50%	39%	53%	38%	46%	39%	42%	40%	43%	40%	43%
45-49	45%	50%	45%	51%	45%	48%	44%	50%	44%	48%	45%	52%	44%	51%
50-54	48%	54%	48%	54%	49%	52%	48%	52%	48%	52%	49%	54%	48%	55%
55-59	51%	54%	50%	58%	51%	58%	50%	56%	50%	55%	51%	57%	50%	57%
60-64	49%	54%	48%	55%	49%	59%	48%	56%	48%	53%	48%	59%	48%	56%
65-69	41%	55%	42%	63%	42%	61%	40%	58%	41%	50%	41%	59%	41%	60%

Table 5: Probit, Marginal Coefficients. Dependent Variables: (i) Ever smoked daily (Yes/No); (ii) Heavy drinking (Yes/No).

	Ever Smoked daily			Heavy Drinking		
	All	Female	Male	All	Female	Male
<i>ACEs variables:</i>						
Harm mother	0.0238*** (0.0075)	0.0131 (0.0117)	0.0393*** (0.0124)	0.0231*** (0.0057)	0.0191*** (0.0064)	0.0286*** (0.0096)
Harm father	0.0197** (0.0099)	0.0323*** (0.0126)	0.0038 (0.0144)	0.0146*** (0.0052)	0.0106* (0.0071)	0.0174* (0.0091)
Harm other	0.0162 (0.0113)	0.0152 (0.0194)	0.0184 (0.0196)	-0.0058 (0.0094)	-0.0058 (0.0098)	-0.0050 (0.0147)
Understanding mother	0.0369*** (0.0100)	0.0307*** (0.0105)	0.0395*** (0.0129)	-0.0007 (0.0063)	-0.0076 (0.0078)	0.0076 (0.0098)
Understanding father	0.0055 (0.0090)	0.0076 (0.0093)	0.0081 (0.0123)	0.0054 (0.0053)	0.0012 (0.0060)	0.0106 (0.0099)
Relationship mother	0.0309** (0.0138)	0.0369*** (0.0135)	0.0066 (0.0185)	-0.0134* (0.0078)	-0.0044 (0.0094)	-0.0266* (0.0145)
Relationship father	0.0318*** (0.0109)	0.0278*** (0.0139)	0.0388** (0.0163)	-0.0059 (0.0062)	-0.0055 (0.0071)	-0.0045 (0.0118)
Education of respondents	yes	yes	yes	yes	yes	yes
Education of parents	yes	yes	yes	yes	yes	yes
SES controls	yes	yes	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes	yes	yes
Recession dummies	yes	yes	yes	yes	yes	yes
N obs.	26637	14977	11660	26092	14598	11482

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . All the reported coefficients are marginal effects. Models include as control variables educational level of respondents and their parents, SES variables when respondents were 10 years old (if father was unemployed, household size, number of rooms in the house, more than 100 books in the house, occupation of the main bread winner, economic condition of the household, and family moved due to financial hardship), generation, recession and country dummies.

Table 6: OLS, Dependent Variable: Number of Years of Smoking

	Years of Smoking		
	All	Female	Male
<i>ACEs variables:</i>			
Harm mother	0.766* (0.377)	1.486*** (0.376)	0.258 (0.629)
Harm father	1.173*** (0.380)	1.673** (0.722)	1.003** (0.434)
Harm other	0.777* (0.418)	1.356* (0.692)	0.409 (0.602)
Understanding mother	1.003** (0.396)	0.818 (0.483)	1.004* (0.569)
Understanding father	0.415 (0.332)	0.337 (0.689)	0.559 (0.414)
Relationship mother	-0.310 (0.839)	-0.454 (0.803)	-0.421 (1.049)
Relationship father	0.020 (0.465)	0.737 (1.018)	-0.591 (0.473)
Education of respondents	Yes	yes	Yes
Education of parents	Yes	yes	Yes
SES controls	Yes	yes	Yes
Country dummies	Yes	yes	Yes
Recession dummies	Yes	yes	Yes
N obs.	10943	4784	6159

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Models include as control variables respondents' age, educational level of respondents and their parents, SES variables when respondents were 10 years old (if father was unemployed, household size, number of rooms in the house, more than 100 books in the house, occupation of the main bread winner, economic condition of the household and family moved due to financial hardship), generation, recession and country dummies.

Table 7: Probit, Marginal Effects. Dependent Variables: (i) Being Overweight (Yes/No); (ii) Being Obese (Yes/No).

	Overweight			Obesity		
	All	Female	Male	All	Female	Male
<i>ACEs variables:</i>						
Harm mother	0.020** (0.008)	0.035*** (0.010)	0.000 (0.016)	0.008 (0.008)	0.017** (0.007)	-0.005 (0.012)
Harm father	0.010 (0.009)	(0.004) (0.014)	0.026** (0.011)	0.012 (0.007)	0.000 (0.010)	0.025** (0.011)
Harm other	-0.004 (0.015)	0.003 (0.029)	-0.012 (0.012)	-0.001 (0.013)	0.005 (0.021)	-0.007 (0.013)
Understanding mother	0.009 (0.007)	0.010 (0.008)	0.008 (0.012)	0.005 (0.007)	0.004 (0.008)	0.008 (0.012)
Understanding father	0.002 (0.008)	-0.003 (0.010)	0.007 (0.009)	0.000 (0.008)	0.007 (0.009)	-0.010 (0.013)
Relationship mother	-0.006 (0.013)	-0.010 (0.020)	-0.002 (0.015)	-0.010 (0.009)	0.004 (0.009)	-0.035*** (0.014)
Relationship father	-0.011 (0.013)	0.005 (0.017)	-0.031* (0.017)	0.004 (0.009)	-0.007 (0.010)	0.018 (0.015)
Education of respondents	yes	Yes	yes	Yes	yes	yes
Education of parents	yes	Yes	yes	Yes	yes	yes
SES controls	yes	Yes	yes	Yes	yes	yes
Country dummies	yes	Yes	yes	Yes	yes	yes
Generation dummies	yes	Yes	yes	Yes	yes	yes
Recession dummies	yes	Yes	yes	Yes	yes	yes
N obs.	26637	14977	11660	26637	14977	11660

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Models include as control variables educational level of respondents and their parents, SES variables when respondents were 10 years old (if father was unemployed, household size, number of rooms in the house, more than 100 books in the house, occupation of the main bread winner, economic condition of the household and family moved due to financial hardship), generation, recession and country dummies.

Table 8: Alternative ACEs measure: ACE Score

	All	Female	Male
<b>Dep. Variable: Ever smoked</b>			
<i>ACEs variables:</i>			
Number of ACEs (sum)	0.023*** (0.002)	0.023*** (0.003)	0.022*** (0.003)
<b>Dep. Variable: Years of smoking</b>			
<i>ACEs variables:</i>			
Number of ACEs (sum)	0.537*** (0.087)	0.739*** (0.125)	0.363*** (0.079)
<b>Dep. Variable: Heavy drinking</b>			
<i>ACEs variables:</i>			
Number of ACEs (sum)	0.004*** (0.001)	0.001 (0.001)	0.007*** (0.002)
<b>Dep. Variable: overweight</b>			
<i>ACEs variables:</i>			
Number of ACEs (sum)	0.000 (0.002)	0.001 (0.003)	0.000 (0.003)
<b>Dep. Variable: obese</b>			
<i>ACEs variables:</i>			
Number of ACEs (sum)	0.003* (0.002)	0.004* (0.002)	0.002 (0.003)
Education of respondents	yes	Yes	yes
Education of parents	yes	Yes	yes
SES controls	yes	Yes	yes
Country dummies	yes	Yes	yes
Generation dummies	yes	Yes	yes
Recession dummies	yes	Yes	yes

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . We include the same set of controls as for the main specifications. When we consider “Ever smoked”, “Heavy drinking”, “Being Overweight” and “Being obese” as dependent variables we report marginal coefficients, while when we look at the years of smoking the reported coefficients come from OLS estimation.

Figure 1. Average marginal effects (left panel) and contrast of average marginal effects (right) of ACE score on the probability of smoking

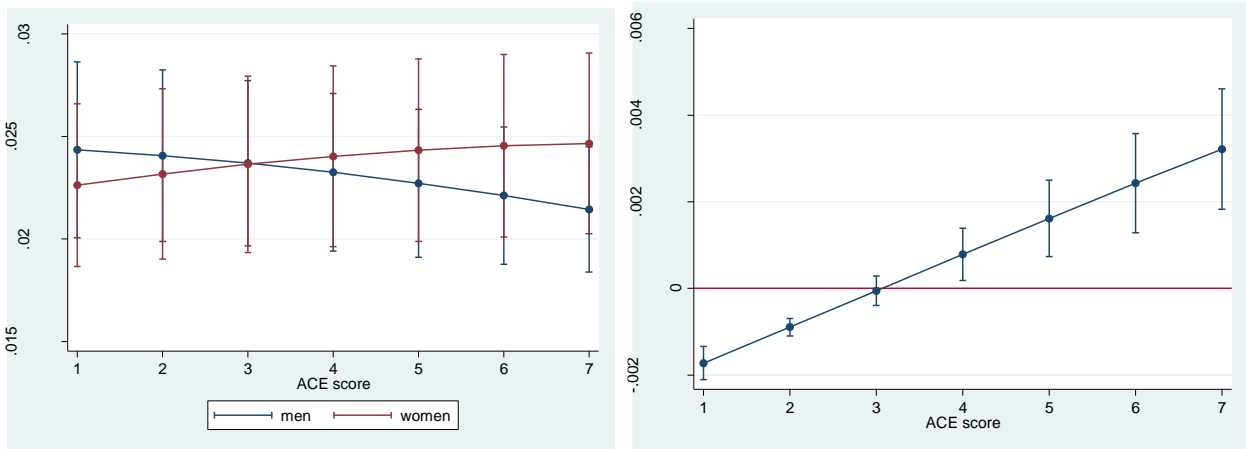


Figure 2. Average marginal effects (left) and contrast of average marginal effects (right) of ACE score on the probability of heavy drinking

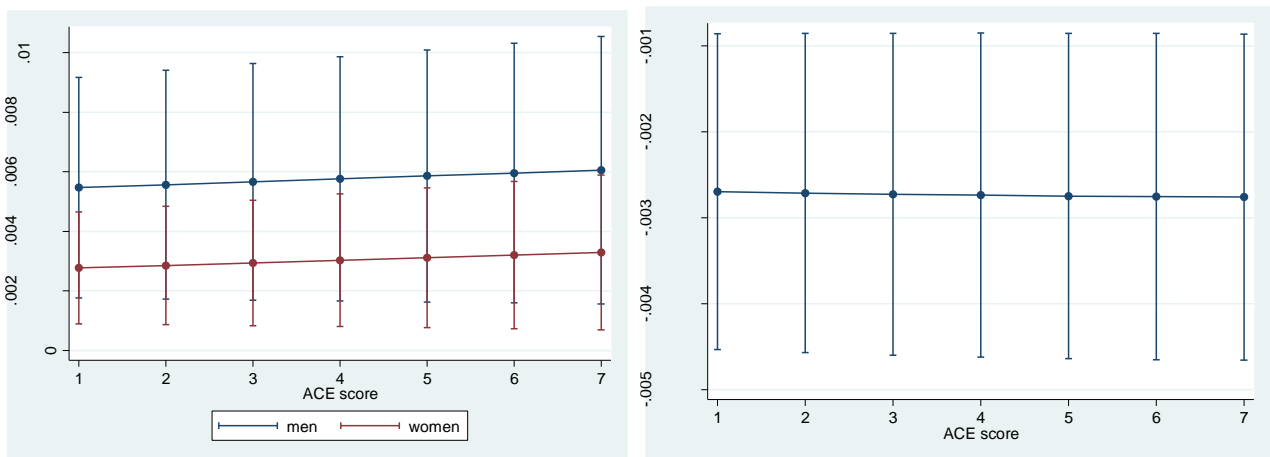


Figure 3. Average marginal effects (left) and contrast of marginal effects (right) of ACE score on the probability of obesity

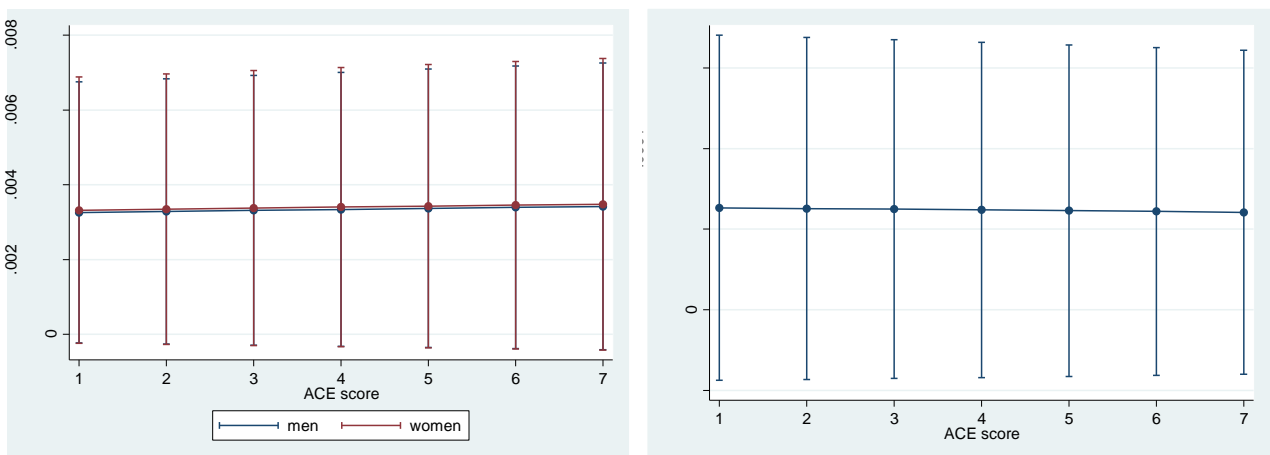


Table 9: Silent Generation, Smoking, Heavy Drinking, Overweight and Obesity

	Smoking	Heavy Drinking	Overweight	Obesity
<b>Silent Generation</b>				
<i>ACEs variables:</i>				
Harm mother	0.022	0.028***	0.014	0.011
	-0.014	-0.008	-0.015	-0.012
Harm father	0.028*	-0.001	-0.021	0.018
	-0.014	-0.009	-0.016	-0.013
Harm other	0.027	0.008	0.012	0.008
	-0.022	-0.013	-0.024	-0.020
Understanding mother	0.044***	-0.008	0.018	-0.004
	-0.014	-0.009	-0.016	-0.013
Understanding father	0.023*	0.007	0.005	0.003
	-0.013	-0.008	-0.014	-0.012
Relationship mother	0.003	-0.039***	-0.004	0.015
	-0.020	-0.014	-0.023	-0.019
Relationship father	0.001	-0.007	-0.026	0.002
	-0.017	-0.011	-0.019	-0.015
Education of respondents	yes	yes	yes	yes
Education of parents	yes	yes	yes	yes
SES controls	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes
Generation dummies	yes	yes	yes	yes
Recession dummies	yes	yes	yes	yes
<i>N. Obs</i>	8827	8631	8827	8827

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Models include as control variables educational level of respondents and their parents, SES variables when respondents were 10 years old (if father was unemployed, household size, number of rooms in the house, more than 100 books in the house, occupation of the main bread winner, economic condition of the household and family moved due to financial hardship), generation, recession and country dummies.

Table 10: Baby Boomers, Smoking, Heavy Drinking, Overweight and Obesity

	Smoking	Heavy Drinking	Overweight	Obesity
<b>Baby Boomers</b>				
<i>ACEs variables:</i>				
Harm mother	0.033***	0.021***	0.010	0.015*
	-0.010	-0.007	-0.010	-0.009
Harm father	0.014	0.022***	0.003	0.009
	-0.011	-0.007	-0.011	-0.009
Harm other	0.010	-0.013	-0.008	-0.007
	-0.015	-0.010	-0.015	-0.013
Understanding mother	0.030***	0.001	-0.003	0.011
	-0.011	-0.007	-0.011	-0.009
Understanding father	0.001	0.004	-0.001	-0.003
	-0.010	-0.006	-0.010	-0.008
Relationship mother	0.041***	-0.001	0.003	-0.021*
	-0.015	-0.010	-0.015	-0.012
Relationship father	0.044***	-0.004	-0.004	0.003
	-0.012	-0.008	-0.012	-0.010
Education of respondents	yes	yes	yes	yes
Education of parents	yes	yes	yes	yes
SES controls	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes
Generation dummies	yes	yes	yes	yes
Recession dummies	yes	yes	yes	yes
<i>N. Obs</i>	17586	17241	17586	17586

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Models include as control variables educational level of respondents and their parents, SES variables when respondents were 10 years old (if father was unemployed, household size, number of rooms in the house, more than 100 books in the house, occupation of the main bread winner, economic condition of the household and family moved due to financial hardship), generation, recession and country dummies.



Table 11: Nordic countries, Smoking, Heavy Drinking, Overweight and Obesity

	Smoking	Heavy Drinking	Overweight	Obesity
<b>Nordic countries</b>				
<i>ACEs variables:</i>				
Harm mother	0.017 (0.025)	0.000 (0.017)	0.006 (0.025)	0.018 (0.021)
Harm father	0.070*** (0.026)	0.005 (0.016)	0.021 (0.026)	0.013 (0.022)
Harm other	0.037 (0.031)	0.015 (0.020)	0.021 (0.031)	-0.001 (0.027)
Understanding mother	0.039* (0.022)	0.001 (0.014)	-0.013 (0.022)	0.023 (0.019)
Understanding father	0.019 (0.019)	0.021* (0.013)	0.030 (0.019)	-0.005 (0.017)
Relationship mother	0.067** (0.028)	-0.007 (0.019)	0.022 (0.028)	-0.026 (0.024)
Relationship father	0.022 (0.025)	0.012 (0.016)	-0.032 (0.025)	0.028 (0.021)
Education of respondents	yes	yes	yes	yes
Education of parents	yes	yes	yes	yes
SES controls	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes
Generation dummies	yes	yes	yes	yes
Recession dummies	yes	yes	yes	yes
<i>N. Obs</i>	4847	4796	4847	4847

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Models include as control variables educational level of respondents and their parents, SES variables when respondents were 10 years old (if father was unemployed, household size, number of rooms in the house, more than 100 books in the house, occupation of the main bread winner, economic condition of the household and family moved due to financial hardship), generation, recession and country dummies.

Table 12: Germanic countries, Smoking, Heavy Drinking, Overweight and Obesity

	Smoking	Heavy Drinking	Overweight	Obesity
<b>Germanic countries</b>				
<i>ACEs variables:</i>				
Harm mother	0.020 (0.016)	0.017 (0.012)	0.018 (0.016)	0.011 (0.013)
Harm father	0.027* (0.016)	0.029** (0.012)	0.001 (0.016)	0.013 (0.013)
Harm other	0.037* (0.022)	-0.045** (0.018)	-0.029 (0.022)	0.004 (0.018)
Understanding mother	0.061*** (0.016)	0.013 (0.012)	0.015 (0.016)	-0.010 (0.012)
Understanding father	0.004 (0.014)	-0.006 (0.011)	-0.003 (0.014)	-0.010 (0.012)
Relationship mother	0.019 (0.020)	-0.017 (0.016)	0.002 (0.020)	-0.003 (0.017)
Relationship father	0.038** (0.017)	0.009 (0.013)	-0.038** (0.017)	0.002 (0.015)
Education of respondents	yes	yes	yes	yes
Education of parents	yes	yes	yes	yes
SES controls	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes
Generation dummies	yes	yes	yes	yes
Recession dummies	yes	yes	yes	yes
<i>N. Obs</i>	7901	7795	7901	7901

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Models include as control variables educational level of respondents and their parents, SES variables when respondents were 10 years old (if father was unemployed, household size, number of rooms in the house, more than 100 books in the house, occupation of the main bread winner, economic condition of the household and family moved due to financial hardship), generation, recession and country dummies.

Table 13: Latin countries, Smoking, Heavy Drinking, Overweight and Obesity

	Smoking	Heavy Drinking	Overweight	Obesity
<b>Latin countries</b>				
<i>ACEs variables:</i>				
Harm mother	0.017 (0.017)	0.032*** (0.008)	0.043** (0.018)	-0.026* (0.014)
Harm father	-0.005 (0.019)	-0.015 (0.010)	-0.048** (0.020)	0.029* (0.016)
Harm other	-0.011 (0.023)	0.026** (0.011)	-0.006 (0.025)	-0.015 (0.019)
Understanding mother	0.035** (0.016)	-0.003 (0.009)	-0.014 (0.017)	0.008 (0.013)
Understanding father	0.005 (0.015)	0.013* (0.008)	0.001 (0.015)	-0.016 (0.012)
Relationship mother	0.013 (0.023)	-0.018 (0.014)	0.001 (0.025)	-0.024 (0.020)
Relationship father	0.029 (0.019)	-0.029*** (0.011)	0.005 (0.020)	0.020 (0.016)
Education of respondents	yes	yes	yes	yes
Education of parents	yes	yes	yes	yes
SES controls	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes
Generation dummies	yes	yes	yes	yes
Recession dummies	yes	yes	yes	yes
<i>N. Obs</i>	7112	6764	7112	7112

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Models include as control variables educational level of respondents and their parents, SES variables when respondents were 10 years old (if father was unemployed, household size, number of rooms in the house, more than 100 books in the house, occupation of the main bread winner, economic condition of the household and family moved due to financial hardship), generation, recession and country dummies.

Table 14: Eastern countries, Smoking, Heavy Drinking, Overweight and Obesity

	Smoking	Heavy Drinking	Overweight	Obesity
<b>Eastern countries</b>				
<i>ACEs variables:</i>				
Harm mother	0.044*** (0.015)	0.026*** (0.009)	-0.017 (0.016)	0.028** (0.014)
Harm father	0.014 (0.017)	0.024** (0.010)	0.006 (0.018)	0.006 (0.015)
Harm other	0.030 (0.031)	-0.013 (0.020)	0.026 (0.033)	0.027 (0.029)
Understanding mother	-0.003 (0.020)	-0.008 (0.013)	0.030 (0.021)	-0.027 (0.019)
Understanding father	0.002 (0.018)	-0.007 (0.011)	-0.014 (0.018)	0.042*** (0.016)
Relationship mother	0.026 (0.031)	-0.017 (0.021)	-0.023 (0.033)	-0.006 (0.029)
Relationship father	0.025 (0.025)	0.023 (0.016)	0.033 (0.026)	-0.043* (0.023)
Education of respondents	yes	yes	yes	yes
Education of parents	yes	yes	yes	yes
SES controls	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes
Generation dummies	yes	yes	yes	yes
Recession dummies	yes	yes	yes	yes
<i>N. Obs</i>	6777	6737	6777	6777

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Models include as control variables educational level of respondents and their parents, SES variables when respondents were 10 years old (if father was unemployed, household size, number of rooms in the house, more than 100 books in the house, occupation of the main bread winner, economic condition of the household and family moved due to financial hardship), generation, recession and country dummies.

Table 15: ACE score and Health later in life: Chronic Diseases, Limitations with daily-living activities (ADL), and GALI (Global Activity Limitations Indicator)

Panel A: Ever smoked daily	<i>Model (1)</i>	<i>Model (2)</i>	<i>Model (3)</i>	<i>Model (4)</i>
<i>Variables:</i>				
ACE score	0.0288*** (0.0031)	0.0458*** (0.0064)	0.0459*** (0.0100)	0.0618*** (0.0085)
Residuals		0.0972*** (0.0183)	0.0948*** (0.0266)	0.1066*** (0.0189)
Panel B: Heavy drinking	<i>Model (1)</i>	<i>Model (2)</i>	<i>Model (3)</i>	<i>Model (4)</i>
<i>Variables:</i>				
ACE score	0.0075*** (0.0025)	0.0663*** (0.0083)	0.0467*** (0.0104)	0.0609*** (0.0086)
Residuals		-0.0560 (0.0437)	-0.0040 (0.0356)	-0.0473** (0.0238)
Panel C: Being Obese	<i>Model (1)</i>	<i>Model (2)</i>	<i>Model (3)</i>	<i>Model (4)</i>
<i>Variables:</i>				
ACE score	0.0031 (0.0195)	0.0458*** (0.0060)	0.0458*** (0.0097)	0.0617*** (0.0084)
Residuals		0.4430*** (0.0195)	0.3990*** (0.0315)	0.3436*** (0.0157)
Other Early Life conditions	yes	yes	yes	yes
Education of parents	no	yes	yes	yes
SES controls	no	yes	yes	yes
Country dummies	no	yes	yes	yes
Recession dummies	no	yes	yes	yes

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Model 1 includes as dependent variables risk behaviors (smoking, drinking and obesity), while the independent variables are SES variables when respondents were 10 years old, and education of parents. Models 2, 3 and 4 include as dependent variables different health outcomes later in life (chronic diseases, ADL, and GALI), while the control variables are the educational level of respondents and their parents, age of respondents, SES variables when respondents were 10 years old (if father was unemployed, household size, number of rooms in the house, more than 100 books in the house, occupation of the main bread winner, economic condition of the household and family moved due to financial hardship), generation, recession and country dummies.