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Wounds of the past, screens of the present: how childhood adversities shape social media behaviours in adulthood

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Abstract

This paper explores whether individuals that grew up in adverse environments are more likely to engage in harmful use of social media later in life. We rely on the first EU-wide, individual-level survey that comprises information on social media usage time, patterns, motivations, and potential overuse, together with a rich set of socio-economic conditions, experiences of loneliness, and traumatic events in childhood of individuals residing in 27 European member states. We find that the presence of close relatives with severe drinking and mental health problems during childhood is positively associated with excessive use of social media in adulthood. Adverse childhood environments have a significant impact on passive overuse of digital platforms, leading to increased neglect of work and family responsibilities. The results also indicate interesting geographical patterns as well as gender and cohort effects, with younger male individuals and those living in Northern and Eastern European countries being particularly affected. Finally, we show that the childhood environment spillovers are, to some extent, mediated by loneliness and social isolation in adulthood. Our findings have significant policy implications since the interplay between the excessive social media use and adverse childhood experiences may jointly undermine individuals' well-being and cognitive development, representing a pressing public health issue.

Keywords Adverse childhood conditions · social media overuse · neglect · loneliness · social isolation

JEL classification L82 · D91 · I12 · I31 · H4

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1 Introduction

In late November 2024, the Australian government imposed a ban on social media for young people under 16, in order to safeguard their mental health and well-being from its detrimental effects. Just one year earlier, the European Digital Services Act (DSA) introduced protections for European users through enhanced privacy safeguards, platform transparency requirements, and mandatory removal protocols for harmful or illegal content. This comes after two decades of a sharp growth in social media consumption worldwide, expanding from 970 million users in 2010 to approximately 5.17 billion by July 2024. The market has witnessed both quantitative expansion and functional diversification, with key platforms like Facebook (2004), Snapchat (2011), Instagram (2013), and TikTok (2016) emerging during this period (Ortiz-Ospina, 2019; Yuriy, Tho and Oleksandr, 2021). Initially focused on interpersonal text-based interactions, social media platforms now serve multifaceted purposes, including socialisation, entertainment, professional networking, and information dissemination (Aichner and Jacob, 2015). In 2023, more than 83% of Europeans aged 16-29 years were engaged daily in social network platforms, compared to 60% for the total population (Eurostat, 2024).[1] In the US, about 75% of adults under 30 used at least five of the platforms, which is far higher than the shares of those aged 30 to 49 (53%), 50 to 64 (30%), and those 65 and older, who register only 8% (Pew Research Center, 2024).[2]

While social media can provide some undoubted benefits, excessive or inappropriate use can lead to serious social dysfunction and mental (or emotional) disorders and impair other long-term economic prospects, such as poorer educational and occupational outcomes. According to the stimulation hypothesis (Gross, 2004; Valkenburg and Peter, 2007), social media platforms provide opportunities for maintaining contact with friends and family and facilitate the formation of new connections. The displacement hypothesis, on the other hand, emphasises that increased social media use is associated with less face-to-face or direct communication with close friends and relatives, correspondence challenges, and social and/or physical appearance comparisons, which may all lower social skills and overall well-being (Kraut et al., 1998). However, neither of these hypotheses adequately captures the complexities of the relationship between social media, relationship quality, and well-being. The interplay between costs and benefits of social media consumption may not necessarily result in a linear relationship. This is in line with the digital Goldilocks hypothesis (Przybylski and Weinstein, 2017), which suggests that moderate use of social media is associated with better psychosocial functioning than lower levels of digital engagement, while excessive use can become harmful.

Even though the empirical assessment of the relationship between social media consumption and well-being is far from being conclusive, several studies suggest that intensive digital platform use positively correlates with mental health disorders and other emotional dysfunctionalities, such as loneliness and social isolation (Cabeza Martínez et al., 2025; Hancock et al., 2022). Some recent contributions have moved

[1] For more info, see https://ec.europa.eu/eurostat/statistics-explained/index.php?oldid=639272

[2] For more info, see https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2024/01/PI_2024.01.31_Social-Media-use_report.pdf

forward and relied on experimental and quasi-experimental designs as an attempt to isolate social media consumption's direct effects. Reed, Fowkes and Khela (2023) analyse the existing findings on the relationship between social media and well-being in an experimental setting and find that reducing social media activity by 15 min a day translates into a lower social media dependence and improved general health and immune functioning, as well as reduced feelings of loneliness and depression. These results complement the previous findings in the literature on prolonged reduction of social media use (Hunt, All, Burns and Li, 2021, 2018). Along similar lines, Allcott, Braghieri, Eichmeyer and Gentzkow (2020) find that deactivating Facebook for the four weeks before the 2018 US midterm election emphasised socialisation within family and friends and increased subjective well-being. To complement these findings, Braghieri, Levy and Makarin (2022) offer quasi-experimental estimates showing that the introduction of Facebook across US colleges in the mid-2000s had a negative effect on student mental health and their academic performance. The authors also emphasise that part of this effect is driven by unfavourable social comparisons, which may be particularly harmful during formative years when identity development is most critical (Crone and Konijn, 2018; Orben, Przybylski, Blakemore and Kievit, 2022). Along similar lines, Amez, Vujic, Marez and Baert (2023) and Beland and Murphy (2016) find that increased overall smartphone use results in a significant decrease in exam scores and the proportion of exams passed.

To add complexity, negative effects of social media use may be more pronounced for individuals with a higher baseline risk for mental disorders (Braghieri et al., 2022). Among factors influencing the predisposition of experiencing mental problems, risky health behaviours, or loneliness, the adverse conditions experienced during childhood may play a prominent role (Brugiavini, Buia, Kovacic and Orso, 2023; Hughes, Lowey, Quigg and Bellis, 2016; Kovacic et al., 2024; Nelson et al., 2020). Adverse childhood experiences (ACE henceforth)[3] refer to a set of childhood traumatic events such as physical, sexual and emotional abuse, physical and emotional neglect, household substance abuse, household mental illness and parental separation or divorce (Finkelhor, Shattuck, Turner and Hamby, 2015). These events may lead individuals to lose trust in the real world and authentic relationships, increasing their social isolation. Moreover, some epidemiological literature have established a significant correlation between adverse childhood experiences and propensity for behavioural addiction disorders (Hao, Li, Liang and Geng, 2024; Mi-Sun and Soo-Young, 2023) with the mechanism operating through diminished self-efficacy, social isolation, heightened anxiety, and maladaptive cognitive patterns (Li et al., 2023). Social media in this context may serve as an optimal coping strategy, leading individuals to spend progressively more time online seeking relief, running into a risk of social media overuse or addiction. This mechanism is theoretically consistent with rational choice models, as the internet presents minimal barriers to entry while maximizing perceived benefits through anonymity and accessibility. The substitution effect becomes particularly salient when individuals seek to minimize exposure to stress and emotional problems, social anxiety and isolation (Wu et al., 2022). Furthermore, coping mechanisms related to social media may not only depend

[3] Throughout the manuscript, the terms "adverse childhood conditions" and "ACE" are used interchangeably.

on the amount of time spent online but also on the nature of digital platform usage. Recent studies highlight that not all social media use is the same. For instance, Cabeza Martínez et al. (2025) indicate that "how" young Europeans engage with passive scrolling rather than active engagement (posting and communication) being more strongly associated with loneliness and negative mental health effects than the amount of time they spend online. These findings highlight the complex nature of the phenomenon, which requires a multifaceted approach to fully understand. Key dimensions to consider, therefore, include the intensity of platform engagement, the type of interaction (active versus passive), and the potential impact of social media on users' daily lives, such as neglecting work or family responsibilities due to compulsive use, or turning to social media as a coping mechanism for negative emotions.

Beyond psychological and relational aspects, the interplay between ACE and social media use also has significant economic implications, affecting both micro-economic factors, such as individual human capital development and labour productivity, and macroeconomic outcomes, including aggregate output, public health expenditures, and intergenerational welfare. In general, children exposed to adversities often accumulate less human capital, achieving lower educational attainment and skill development, reducing their labour market participation and productivity in adulthood. Empirical studies find that each additional childhood hardship is associated with significantly lower earnings and a greater dependence on public welfare support during working-age years, outcomes largely mediated by deficits in health and education accumulated in youth (Cunha and Heckman, 2007; Metzler, Merrick, Klevens, Ports and Ford, 2017; Schurer and Trajkovski, 2019; Kovacic and Orso, 2022; Brugiavini et al., 2023). Multiple mechanisms may explain these long-term effects. In the context of social media consumption, as previously mentioned, exposure to ACE may contribute to excessive or addictive social media use as a coping mechanism for emotional distress, such as anxiety, social isolation, or maladaptive cognitive patterns, that often arise in individuals exposed to early trauma. This reliance on digital platforms may, in turn, exacerbate negative health outcomes and impair other long-term economic prospects, potentially leading to worse educational and occupational outcomes.

Despite the salience of the topic, little is known about potential relationships between childhood trauma and social media (over)use later in life. The objective of this paper is to fill part of this gap and offer evidence on potential effects of adverse childhood environments on social media use in adulthood. Using data from the European Union Loneliness Survey (EU-LS), a comprehensive and novel dataset covering all 27 EU member states and providing detailed information on individuals' socio-economic characteristics, backgrounds, and social and emotional experiences, including a dedicated module on social media engagement, this study examines multiple dimensions of social media use. Specifically, we investigate the intensity of usage of instant messaging tools and social networking sites, the distinction between active and passive engagement, and the extent to which social media interferes with daily activities, such as neglecting work or family responsibilities or using social media to improve one's mood. The latter dimension is particularly salient, as it may reflect addictive-like behaviour with potentially adverse psychological and economic consequences.

Among childhood adversities, we consider a battery of questions, including familial drinking, sickness and disability, and mental health issues, as well as the quality of the relations with parents. We estimate a set of logit models to explore how these adversities relate to different aspects of social media use. Moreover, to investigate the underlying mechanisms linking ACE to excessive social media consumption, we conduct a mediation analysis to examine how loneliness and social connectedness mediate the relationship between childhood trauma and social media usage patterns in adulthood.

Furthermore, the EU-LS data allows us to account for the presence of social desirability bias in responding to sensitive and cognitively demanding questions involving emotions or social stigma, such as traumatic events in childhood, which may lead to significant under-reporting (Tourangeau and Yan, 2007). Social desirability bias is a type of response bias in which people answer questions or act in ways that they believe will be viewed positively by others. We control for individual-specific response times to questions on adverse childhood experiences and their deviations from the average response time to other "neutral" questions in the survey, as social desirability may influence response processes by prolonging the time that respondents employ to respond to questions that elicit the emotional response (Andersen and Mayerl, 2019; Stocké, 2007). This novel information may also help to account for another potential bias, namely recall bias or colouring, according to which respondents affected by emotional distress due to adverse childhood events may tend to recall their past experiences in a more negative fashion (Brugiavini et al., 2023), potentially leading to over-reporting.

Our main finding is that individuals raised in familial environments with close relatives suffering from drinking problems or mental health issues are significantly more likely to excessively engage in social networking sites and passive scrolling. As a result, they neglect their work and family duties more frequently with respect to their counterparts who spend less time on digital platforms or engage in more active usage, such as instant messaging tools. We also find a stronger association between alcohol abuse and mental problems of close relatives in childhood and passive social media engagement among younger individuals. This is an important finding due to the documented strong association between passive use of social media and worse mental health outcomes, especially among younger individuals in the EU-LS sample (Cabeza Martínez et al., 2025). Furthermore, some interesting differences arise in terms of gender and macro-region of residence. Adverse childhood events are significantly associated with passive social media consumption for males, while for women, the correlation is not significantly different from zero or, in some cases, much weaker than for men. Additionally, alcohol abuse by close relatives significantly correlates with harmful social media use in Nordic and Eastern countries, whereas in Southern regions, reporting low emotional closeness to the mother plays a key role in shaping problematic digital engagement. Finally, we highlight the importance of loneliness and social isolation as mediating factors between ACE and excessive social media consumption. Loneliness mediates about 20% of the effect of mental illnesses in the household during childhood on social networking sites overuse, 22.7% of its effect on passive social media use, and up to 34.2% in the case of neglecting work or family duties due to excessive social media consumption. The mediating effect of loneliness is less pronounced for social media use aimed at

improving mood and satisfaction, whereas the mediating effect of social connectedness, while statistically significant, has a smaller magnitude.

The rest of the paper is organised as follows. Section 2 presents the data and the variables used in the study, Section 3 describes the empirical strategy while Section 4 reports the main results. Section 5 concludes.

2 Data and Variables

The European Union Loneliness Survey (EU-LS) represents the first comprehensive study on loneliness across all 27 EU member states.[4] Conducted in late 2022, it gathered data from 25,646 participants aged 16 and above. The survey was administered online across all member states, with approximately 1,000 respondents per country except for Cyprus, Luxembourg, and Malta (around 500).[5] The survey was translated into all official EU languages, with the exception of Irish. In linguistically heterogeneous countries (such as Belgium and Luxembourg), the survey was made available in each official language.[6]

Although the survey was primarily designed to capture different aspects and measurements of loneliness, it also contains a rich amount of information on individuals' health, civic engagement, preferences, and socio-economic conditions. Most importantly, the EU-LS includes a specifically designed module on social media use that examines usage time, patterns, motivations, and potential overuse. In addition to a wide array of measures of loneliness, the survey also collects data on several indicators of social connectedness, such as the frequency of contact with family and friends, the number of close friends and family members, and participation in social activities, as well as a series of questions about stressful life events and adverse childhood experiences.[7]

2.1 Social Media Use

The survey measures daily time spent on social media, separated into two different categories: social network sites (SNS) and instant messaging tools (IMT). SNS are

[4] For more information on the survey, see https://joint-research-centre.ec.europa.eu/scientific-activities-z/survey-methods-and-analysis-centre-smac/loneliness/eu-loneliness-survey_en

[5] Quotas based on the population of each member state were used for sample selection from the online consumer panels to reflect the target population in terms of age, gender, education, and NUTS region of residence. Additionally, the survey collected data on a second sample, including only four selected countries, each representing one geographical region of the European Union, namely Sweden, Italy, Poland, and France, with the respondents recruited from an existing probability-based panel (KnowledgePanel EU).

[6] A simple forward translation was used for most questions, as well as for section introductions. For more complex questions (*i.e.*, 31 out of the 82 survey items, including social ACE, social media use, social isolation and loneliness), a three-step back-translation procedure was implemented. This process involved three professional translators per language, each responsible for one step: forward translation, back translation, and final review.

[7] The full dataset is available on the following link: https://data.jrc.ec.europa.eu/dataset/82e60986-9987-4610-ab4a-84f0f5a9193b.

online digital platforms aimed at creating and sharing personal profiles, such as image-focused (Instagram, TikTok), text-focused (X), or mixed (Facebook) sites. IMT, on the other hand, are web services for private, real-time conversations and are typically text-based (WhatsApp, Facebook Messenger, SnapChat). The EU-LS asks respondents about their daily usage time for both SNS and IMT, with eight response options ranging from "never" to "more than 5 hours".[8] In order to capture the overuse of both social networking sites and instant messaging tools, we have created two separate indicators: one for intense SNS use and another for intense IMT use. Following the digital Goldilocks hypothesis (Przybylski and Weinstein, 2017, 2019; Przybylski, Orben and Weinstein, 2020), both are defined as 1 if daily usage exceeds 2 hours and 0 otherwise.[9] The Goldilocks hypothesis suggests that the relationship between screen time and psycho-social outcomes follows an inverted U-shaped curve. Moderate levels of screen use can actually be beneficial to adolescents' mental and social development, supporting social connection, identity exploration, and emotional regulation. In contrast, both too little and too much usage are associated with poorer psycho-social outcomes. Importantly, moderate use (typically within the range of 1 to 2 hours per day) has been consistently shown to correlate with the optimal zone of digital engagement, where individuals gain the social and cognitive benefits of digital platforms without experiencing the displacement effect. Furthermore, the two-hour boundary also resonates with broader public health recommendations, such as those from the American Academy of Pediatrics (AAP)[10], which recommend capping recreational screen time at two hours per day for children and adolescents. Alongside using dichotomised versions of the variables, we test the robustness of our results using the full categorical scale and an alternative four-hour cut-off.

In addition, the survey allows us to categorise social media users into active and passive ones. Active use generally involves actions enabling immediate interaction with other individuals, including posting content, sharing content, commenting on posts, and chatting in groups or privately. Passive use encompasses non-interactive consumption of content such as scrolling through pictures, watching videos, reading status updates, viewing profiles, and reading news and personal information in profiles and chat groups. The survey records the frequency of passive usage (looking through feeds and viewing videos) and active usage (publishing content and chatting with others). Response options range from "never" to "more than 30 times per day". We define intense passive and active users as those who report using social media 16 times or more per day in their respective modes (Cabeza Martínez et al., 2025). As before, we use the full categorical scale in the empirical analysis to test the robustness of the main findings.

Figure 1 and Figure 5 (in the appendix) show the distribution of social media users by age and gender, and across countries. Female respondents tend to use social networking and instant messaging more frequently, especially when they are younger

[8] The full range of response options in the survey were: never, less than 10 minutes per day, 10-30 minutes per day, 31-60 minutes per day, 1-2 hours per day, 2-3 hours per day, 4-5 hours per day, and more than 5 hours per day.

[9] Despite the increasing overlap in functionalities among communication platforms, we have maintained separate indicators for SNS and IMT for the sake of clarity and because of their different nature.

[10] For more details, see https://publications.aap.org/pediatrics/article/132/5/958/31699/Children-Adolescents-and-the-Media.

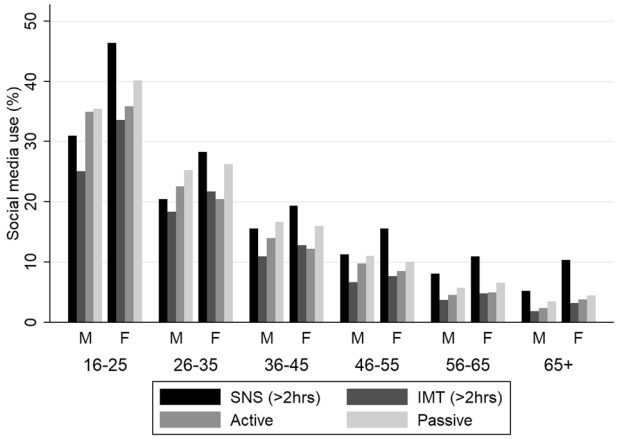


Fig. 1 Social media use, by gender and age, (%). Source: EU-LS survey, 2022. Number of observations: 23,377. Share of female: 52%, share of male: 48%. Population means: SNS (18.1%), IMT (12.3%), Active (14.0%), Passive (16.4%)

(16-25 years old). Similar evidence is observed for the passive social media consumption. When looking at the cross-country differences, excessive social networking is prevalent in southeastern and eastern Europe, with more than 25% of the population engaged in intensive social media consumption. Those countries also register relatively higher shares of passive social media users.

The EU-LS also examines how social media use affects users' daily responsibilities. Specifically, respondents were asked to indicate how often (ranging from "never" to "several times a day") they neglect their work, school, or family obligations due to time spent on social media. Moreover, they are asked to indicate how often they use social media to improve their mood, with response options ranging from "never" to "several times a day".[11] In addition to considering the full scale of options, we create two binary variables that equal 1 if the respondent reports neglecting work, school, or family responsibilities, or uses social media to improve his/her mood at least several times per day. Roughly the same percentage of individuals (18%) report neglecting work or family duties and using social media in order to feel better (Table 10, in the appendix).

2.2 Adverse Childhood Experiences

Within a specifically designated module, the survey participants were asked to recall their childhood relationships with their parents before age 16, rating how emotionally close they felt to their mother and father during that period, as well as whether their relatives had any history of mental health conditions, alcohol problems, or any chronic, severe illnesses, disabilities, or accidents. More in detail, the question about parent-child relationship closeness asks the following: *"All in all, how would you describe your relationship with your parents (mother/father) when you were growing*

[11] The full range of response options for both variables were: "several times a week," "once a day," or "several times a day."

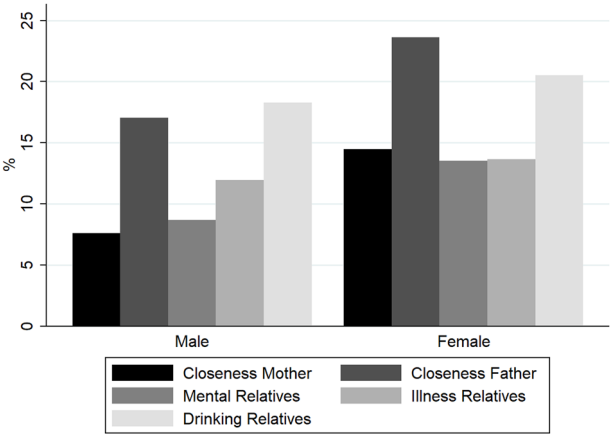
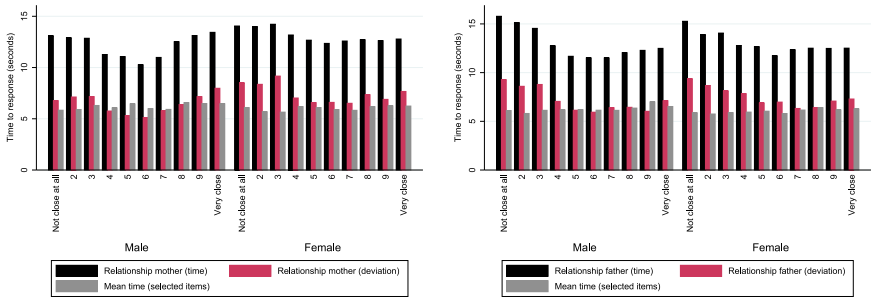


Fig. 2 Adverse childhood experiences, by gender (%). EU-LS survey, 2022. Number of observations: 23,112. Share of female: 52%, share of male: 48%. Population means: Closeness Mother (11.1%), Closeness Father (20.5%), Mental Relatives (11.2%), Illness relatives (12.8%), Drinking Relatives (19.5%)

up?" Respondents can rate emotional closeness to each parent on a scale of 1 to 10, where 1 means "not close at all" and 10 means "very close." Following Kovacic et al. (2024), we categorised the scales into binary variables where 1 represents ratings from 1-5 (indicating lower emotional closeness) and 0 represents ratings from 6-10 (indicating higher emotional closeness).

Regarding the presence of mental health conditions, alcohol abuse, and general chronic illnesses in the household when the respondents were aged 16 or younger, the question is the following: *"To your knowledge, when you were growing up, did any of the below apply to someone among your close relatives (parents, brothers, or sisters)?"* Respondents had the following answering options: (1) Smoke heavily, (2) Drink heavily, (3) Had chronic, severe illnesses, disabilities, or accidents, (4) Had mental health problems, (5) None of the above. From these responses, we created three binary variables that equal 1 if respondents reported having been raised in the presence of close relatives with mental health problems, drinking problems, or general health conditions (including disabilities or accidents). Figure 2 shows the prevalence of the main adverse childhood experiences in the population, separately for males and females, while Figure 6 (in the appendix) reports the % of the total population by country reporting adverse childhood experiences. Interestingly, the prevalence of weaker closeness with parents is more prevalent among women. Cross-country comparisons, on the other hand, suggest that reporting close relatives with severe drinking problems and mental health issues is particularly pronounced in Northern Europe.

To account for potential under- or over-reporting biases due to social desirability and colouring, we control for individual-specific response times to adverse childhood experiences questions. The choice among available alternatives becomes easier (and, hence, the response time shorter) when comparable options are collocated farther away from an individual's indifference point (Konovalov and Krajbich, 2019; Liu and Netzer, 2023; Moffatt, 2005). Information on response time, therefore, may reveal how comfortable and confident the respondents are in declaring their adverse experience in childhood, which, as mentioned before, may involve a considerable



(a) Closeness with mothers in childhood (b) Closeness with fathers in childhood

Fig. 3 Response times to closeness with mothers/fathers versus average response times on other selected neutral questions. (**a**) Closeness with mothers in childhood (**b**) Closeness with fathers in childhood Notes: EU-LS survey, 2022. Mean response time on selected items includes the following questions: gender, relationship status, and having pets at home. Average response times: neutral selected questions - 6.10 (female) and 6.35 (male); closeness with mother/father - 12.77 (female) and 12.35 (male)

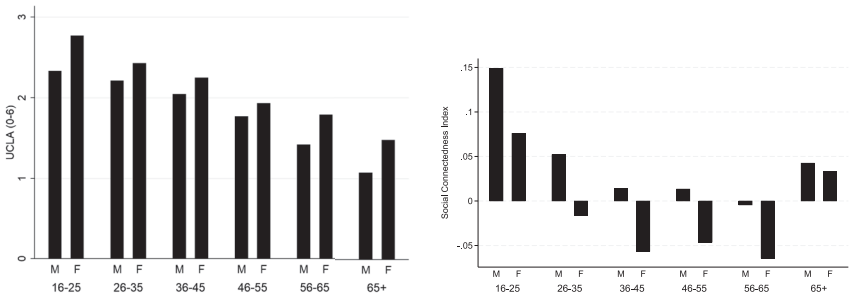
emotional component and/or stigma. Indeed, the data show that individuals take significantly longer time (expressed in seconds) to answer the questions on the closeness with mothers/fathers compared to the average time employed to answer more straightforward questions, such as those on gender, relationship status, or having pets at home (Figure 3). Individuals close to the extremes of the scale imply more time to provide the answer compared to their counterparts opting for intermediate answering options, and this phenomenon is particularly pronounced for male individuals when asked about the relationship with their mothers. The individuals' average response times, however, are stable across answer options. This may indicate that these respondents are more subject to bias in their response since they are more anxious to report their true childhood situation. Similarly, the response times to the question on close relatives with severe drinking or mental health problems are significantly longer compared to the average time to respond (13.16 versus 6.22 seconds, respectively). Finally, average deviations appear to follow a geographical pattern with eastern and northern European countries registering significantly higher levels (Figure 7, in the appendix).

Longer response time for sensitive questions, such as childhood adversities, is not surprising evidence and has been documented for other sensitive questions, such as sexual orientation (Berlingieri and Kovacic, 2025). Their utility as correcting factors is reflected by their influence on the estimated effects of adverse childhood experiences variables, which generally become larger. We will turn to this point in the results section.

In addition to the above adverse conditions in childhood, we also consider the absence of one or both parents, self-reported health status in childhood, and having a group of close friends that respondents felt comfortable spending time with during school years (when they were 6 to 15 years old).

2.3 Loneliness and social connectedness

The EU-LS survey includes various measures of loneliness and social connectedness. As for loneliness, we employ the commonly used indirect measure, namely the



(a) Loneliness (UCLA) (b) Social Connectedness Index

Fig. 4 Loneliness (UCLA) and social connectedness index, by gender and age. (**a**) Loneliness (UCLA) (**b**) Social Connectedness Index Notes: EU-LS survey, 2022. Number of observations: 23,837 (loneliness) and 21,994 (social connectedness). Population means: loneliness (Male: 1.84, Female: 2.13); Social Connectedness Index (Male: 0.037, Female: -0.022)

University of California Los Angeles Loneliness (UCLA) 3-item UCLA scale (Hughes, Waite, Hawkley and Cacioppo, 2004; Russell, 1996), that asks about personal experiences closely related to loneliness, such as having someone to rely on, feeling left out or isolated from others, and having close connections with whom to discuss intimate matters. The main advantage of using this indirect measure is that it does not directly reference loneliness and may provide a more objective picture by reflecting the core definition of loneliness as a perceived deficiency in social relationships.[12] The exact wording of the items included in the UCLA loneliness scale is the following: "*How often do you feel isolated from others?"*, "*How often do you feel you lack companionship?*", "*How often do you feel left out?*". In each case, the available responses are: (1) Hardly ever or never, (2) Some of the time, (3) Often. The option (1) was then assigned a score of 0, option (2) a score of 1, and option (3) was scored 2. A sum score was computed; therefore, the final scale ranges from 0 (not lonely, *i.e.*, those answering (1) to all three items) to 6 (very lonely, *i.e.*, those answering (1) to all three items). Figure 4 (panel a) shows the distribution of UCLA loneliness scores by age and gender.

The survey also includes a rich set of variables related to the size and quality of social networks. Among these, respondents are asked to report the number of close family members and friends, as well as the frequency of meeting them (ranging from "never" to "daily"). Using this information, we build a composite index for family and friends networks by summing the values of the four variables.[13] The higher the index score, the greater the level of social connectedness. Figure 4 (panel b) shows the distribution of the index across age groups and gender.

[12] Indirect measures are generally preferred because they are not subject to potential reporting bias due to individuals' misunderstanding of loneliness and/or because they may under-report their true feelings of loneliness when asked directly due to stigma. This latter aspect may vary by gender or age group, leading to inaccurate conclusions about the prevalence of loneliness in the population.

[13] The variables used are: (i) the number of close family members, (ii) the number of friends, (iii) the frequency of in-person contacts with family members, and (iv) the frequency of in-person contacts with friends. All variables were standardised prior to constructing the index, with a mean of 0 and a standard deviation of 1.

The highest levels of social connectedness are observed among younger individuals, particularly males compared to females. Interestingly, the lowest levels of social connectedness are found among individuals in working age (36 to 65), especially women, whereas an increase is observed among older people. It is worth noting that, when comparing this figure with the previous one on loneliness, the youngest generations report more intense feelings of loneliness than others, despite having higher levels of in-person connectedness with family and friends. This is not surprising, as loneliness is more about the perception of the quality of social relationships, independent of their quantity and/or size of social networks, which may also be culturally specific (Casabianca and Kovacic, 2024; Heu, van Zomeren and Hansen, 2021; Kovacic et al., 2024).

In addition to the core variables described in the previous subsections, we include a set of demographic and socio-economic controls. Specifically, we consider the respondents' age, gender, immigration status (first-generation immigrant or native), educational attainment, employment status, relationship status, household size, number of kids, sexual orientation, and information related to self-assessed health and risky behaviours (smoking, physical exercise, and diet), all measured at the time of the interview. Table 10 in the appendix presents descriptive statistics on these characteristics.

3 Empirical Strategy

In order to explore the relationship between adverse childhood events and social media use in adulthood, both in terms of its intensity and purposes, we first estimate the following set of models:

$$Y_{it} = \omega_0 + \omega_1 ACE_{i,t-1} + \omega_2 T_{it} + \omega_3 T_{it} \times ACE_{i,t-1} + \omega_4 X_{it} + \psi_c + \epsilon_{it}, \qquad (1)$$

where Y_i represents a set of dummy variables capturing different aspects of social media consumption: spending more than 2 hours on social network sites or instant messaging tools, being an active or passive social media user, neglecting work and family duties due to excessive use of social media, and using digital devices in order to feel better. $ACE_{i,t-1}$ is a set of adverse events that occurred during childhood ($t-1$), T_{it} is a vector of individual-specific response times on a set of neutral questions (gender, relationship status, and having pets at home) and adverse childhood experiences questions, and the corresponding deviations from the mean, capturing the presence of social desirability biases and possible chronometric effects. Finally, X_i is a vector of individual demographic and/or socio-economic characteristics, ψ_c includes country dummies and ϵ_i is the error term. In all regression models, standard errors are clustered at the country of residence level.

As a second step, we employ the Karlson-Holm-Breen (KHB) method originally proposed by Karlson, Holm and Breen (2012) and empirically validated by Arpino, Gumà and Julià (2018) and Smith, Lacy and Mayer (2019), among others, to analyse the role of loneliness and social connectedness in mediating the effects of ACE on social media use. This methodological approach enables a systematic comparison between two models: an unadjusted model that regresses social media outcomes on adverse childhood conditions along with all the other control and explanatory

variables, and an adjusted model that additionally incorporates the mediators (loneliness and social connectedness in this case). Through this comparison, the KHB method quantifies the proportion of adverse childhood effect on later-life social media use that operates through these mediating pathways. The method, therefore, allows to decompose mediator contribution to the indirect effect, while capturing the residual influence of early-life trauma (direct effect) in the adjusted model's estimates. The total effect, represented by the unadjusted model's estimates, comprises the sum of both direct and indirect effects.

4 Results

This section presents our main findings. We begin by looking into the links between early-life conditions and time spent on social networking sites and instant messaging tools, the distinctions between types of social media use (active versus passive users), and the extent to which frequent social media use interferes with daily functioning and tasks. After documenting the significant and differential impact of specific early-life events, both in terms of age and gender, as well as across different macro regions, the second part of the analysis looks into the existence of potential underlying mechanisms, with a focus on the role of loneliness and social isolation.

4.1 ACE and social media use

Tables 1 and 2 show the results for the first two measures of social media use, namely the excess time spent on social network sites (SNS) and instant messaging tools (IMT). We group adverse childhood experiences in two broad categories: emotional closeness to parents (relationship quality with mother and father) and adverse familial environments (close relatives with mental and chronic illnesses and/or problems with heavy drinking).[14] Other childhood characteristics include the absence of one or both parents and bad health in childhood. The models estimate the probability of spending more than two hours per day on SNS and IMT, respectively, gradually increasing the set of explanatory and control variables. More precisely, models 1 and 4 include only early-life conditions along with age and gender, while models 2 and 5 expand the set of controls by including risky health behaviours (smoking, physical inactivity, unhealthy diet), religiosity, relationship status, household size, education, employment status, self-reported health status, and belonging to vulnerable population groups such as immigrants and LGB+. Finally, models 3 and 6 add a battery of variables capturing several aspects of individuals' social networks, such as the number of close friends and relatives, frequency of contact, participation in cultural or sport activities, having had few friends in childhood, and feelings of loneliness in adulthood. In all models we control for individuals' average response times, as well as for deviations in response times of adverse childhood experiences questions from the mean time, and their interactions with ACE.

[14] We divided the ACE variables into two groups to address potential collinearity issues, as some variables strongly correlate with each other. Nevertheless, when we ran the model with the complete set of variables, the results remained largely unchanged.

Table 1 Social Network Sites (SNS), Instant Messaging Tools (IMT) and relationship quality with parents

	(1) SNS	(2) SNS	(3) SNS	(4) IMT	(5) IMT	(6) IMT
Closeness mother (chld.)	0.002	-0.007	-0.001	-0.013*	-0.020***	-0.019**
	(0.012)	(0.012)	(0.013)	(0.007)	(0.007)	(0.009)
Closeness father (chld.)	0.003	-0.003	-0.005	-0.002	-0.004	0.003
	(0.009)	(0.010)	(0.011)	(0.007)	(0.007)	(0.008)
Absent parent (chld.)	0.010*	0.004	0.005	0.012**	0.011**	0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Bad health (chld.)	0.042***	0.026***	0.019***	0.013**	0.012*	0.006
	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
Lesbian or gay		0.028	0.029		0.034**	0.031*
		(0.021)	(0.020)		(0.016)	(0.016)
Bisexual		0.036**	0.024*		0.009	0.005
		(0.014)	(0.014)		(0.011)	(0.011)
Other sexual orient.		0.072***	0.070***		0.012	-0.011
		(0.027)	(0.026)		(0.024)	(0.021)
DK/PNS		0.002	0.014		0.042***	0.039**
		(0.016)	(0.018)		(0.014)	(0.017)
Few friends (chld.)			-0.010			-0.014*
			(0.009)			(0.008)
Loneliness (UCLA)			0.017***			0.009***
			(0.002)			(0.002)
Other controls:						
Age and gender	Yes	Yes	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic	No	Yes	Yes	No	Yes	Yes
Network and social act.	No	No	Yes	No	No	Yes
N. Observations	22972	21525	19455	22956	21513	19450

The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

The relationship between adverse childhood conditions and SNS differs significantly from that with IMT. While generally emotional closeness to parents does not emerge as a significant predictor of SNS, exposure to relatives with alcohol abuse problems or with mental health issues during childhood shows a robust and statistically significant association with intensive social network site usage in adulthood. On the other hand, parental alcoholism and mental health problems seem not to have a lasting

Table 2 Social Network Sites (SNS), Instant Messaging Tools (IMT) and adverse familial environments

	(1) SNS	(2) SNS	(3) SNS	(4) IMT	(5) IMT	(6) IMT
Illness relatives (chld.)	0.024**	0.016	0.012	0.033***	0.030***	0.022***
	(0.011)	(0.011)	(0.012)	(0.008)	(0.009)	(0.008)
Mental relatives (chld.)	0.034**	0.029**	0.022	0.021*	0.019*	0.017*
	(0.014)	(0.015)	(0.015)	(0.011)	(0.011)	(0.010)
Drink relatives (chld.)	0.041***	0.037***	0.031***	0.012**	0.006	0.001
	(0.008)	(0.009)	(0.008)	(0.006)	(0.005)	(0.006)
Absent parent (chld.)	0.005	-0.001	0.001	0.006	0.005	0.004
	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
Bad health (chld.)	0.032***	0.015**	0.011	0.005	0.004	0.001
	(0.008)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)
Lesbian or gay		0.022	0.023		0.028*	0.027*
		(0.020)	(0.019)		(0.015)	(0.015)
Bisexual		0.032**	0.021		0.004	0.003
		(0.015)	(0.016)		(0.011)	(0.011)
Other sexual orient.		0.068***	0.066***		0.017	-0.003
		(0.026)	(0.024)		(0.022)	(0.021)
DK/PNS		-0.001	0.005		0.039***	0.039***
		(0.016)	(0.017)		(0.014)	(0.015)
Few friends (chld.)			-0.011			-0.010
			(0.009)			(0.008)
Loneliness (UCLA)			0.016***			0.009***
			(0.002)			(0.002)
Other controls:						
Age and gender	Yes	Yes	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic	No	Yes	Yes	No	Yes	Yes
Network and social act.	No	No	Yes	No	No	Yes
N. Observations	22973	21541	19481	22952	21525	19475

The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: *$p <$ 0.1, **$p < 0.05$, ***$p < 0.01$

influence on intensive instant messaging tool usage, which is significantly higher among individuals whose parents suffered from chronic severe illnesses or disabilities. Interestingly, individuals reporting lower closeness to mothers are less likely to engage in instant messaging tools, even after controlling for the size of social networks,

frequency of contact with friends and relatives, and feelings of loneliness, which may indicate generally higher degrees of introversion of these individuals.

However, these associations do not necessarily indicate a direct relationship between ACE and social media consumption, as childhood environment may significantly correlate with the quality of individuals' social networks later in life (Casabianca and Kovacic, 2024; Guthmuller, 2022; Kovacic et al., 2024), which, in turn, may influence the nature of social media use (d'Hombres and Gentile, 2024; Nowland, Necka and Cacioppo, 2018; Twenge, 2017). The coefficients in models 3 and 6 show that ACE remain significant even after controlling for social isolation and loneliness, although the size of the coefficients is somewhat reduced, indicating the existence of potential indirect channels.[15] Lonelier individuals spend more time on digital tools, which is in line with the existing literature. Furthermore, as demonstrated by Berlingieri and Kovacic (2025), sexual minorities are at higher risk of excessive social media use. Bisexual individuals and those declaring sexual orientation other than gay/lesbian or bisexual are more likely to engage for more than two hours per day on social network sites, while gay and lesbian individuals are more inclined towards instant messaging tools compared to their heterosexual counterparts.

In addition to the excess time spent on social network sites, early-life exposure to adverse environments is also significantly associated with the qualitative nature of digital media use, potentially predisposing individuals toward more passive forms of engagement in adulthood (Table 3). This is important evidence since passive social media use has been associated with different psychological outcomes compared to active engagement in the existing literature (Cabeza Martínez et al., 2025; Evans, Hardacre, Rubin and Tran, 2023; Godard and Holtzman, 2024; Yue, Zhang and Xiao, 2022). More precisely, individuals who experienced familial alcohol abuse during childhood show a higher probability of frequent passive engagement (defined as 16 or more daily instances of scrolling or video watching) with digital platforms. Similar effects emerge for those that experienced bad health in childhood and/or having been raised with close relatives suffering from disabilities or mental health issues, although the latter effects disappear when we account for loneliness in adulthood. This is not surprising since loneliness significantly correlates with adverse childhood conditions (Casabianca and Kovacic, 2024; Guthmuller, 2022; Kovacic et al., 2024). In contrast, emotional closeness to parents does not appear to play any role (Table 4), which may initially seem counter-intuitive, as some studies suggest a positive relationship between adverse parental relationships and social media (over)use (Özaslan, Yildirim, Güney, Güzel and Iseri, 2022). Perceptions and valuations of parental relationships may vary significantly across countries, influencing the reporting rates of questions on emotional closeness and their associations with behavioural outcomes later in life. These cross-country differences may be due to several cultural factors. To examine this issue more in detail, in Section 4.2 we replicate the analysis, splitting the sample by macro region. The evidence in Figure 12 (in the appendix) shows considerable differences in associations between parental relationship quality and social media overuse across four European macro regions, with Northern and

[15] We do not report the coefficients for social isolation for the sake of space and clarity. These, however, are available upon request.

Table 3 Active versus Passive SM use, and adverse familial environments

	(1) Active	(2) Active	(3) Active	(4) Passive	(5) Passive	(6) Passive
Illness relatives (chld.)	0.041***	0.034***	0.031***	0.038***	0.029***	0.017***
	(0.010)	(0.010)	(0.010)	(0.007)	(0.006)	(0.006)
Mental relatives (chld.)	0.021*	0.017	0.015	0.028***	0.019**	0.014
	(0.011)	(0.012)	(0.012)	(0.008)	(0.009)	(0.010)
Drink relatives (chld.)	0.014**	0.011	0.009	0.030***	0.027***	0.023***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
Absent parent (chld.)	0.007	0.010*	0.012**	0.000	0.000	0.002
	(0.005)	(0.006)	(0.006)	(0.008)	(0.007)	(0.007)
Bad health (chld.)	0.011	0.010	0.009	0.028***	0.018**	0.017**
	(0.009)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
Lesbian or gay		0.034*	0.039*		0.007	0.005
		(0.019)	(0.020)		(0.022)	(0.021)
Bisexual		-0.003	-0.003		0.024*	0.015
		(0.011)	(0.011)		(0.013)	(0.012)
Other sexual orient.		0.090***	0.080***		-0.007	-0.007
		(0.030)	(0.029)		(0.021)	(0.022)
DK/PNS		-0.012	-0.007		-0.009	-0.002
		(0.016)	(0.021)		(0.015)	(0.019)
Few friends (chld.)			-0.003			-0.010
			(0.009)			(0.010)
Loneliness (UCLA)			0.004**			0.012***
			(0.002)			(0.002)
Other controls:						
Age and gender	Yes	Yes	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic	No	Yes	Yes	No	Yes	Yes
Network and social act.	No	No	Yes	No	No	Yes
N. Observations	22766	21381	19383	22868	21460	19435

The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

Eastern countries registering a significant positive relationship. We will turn to this point later.

The early-life exposure to within-household alcohol abuse and mental health illness not only correlates with the frequency and nature of social media engagement

Table 4 Active versus Passive SM use, and relationship quality with parents

	(1) Active	(2) Active	(3) Active	(4) Passive	(5) Passive	(6) Passive
Closeness mother (chld.)	-0.001	-0.004	0.002	0.014*	0.011	0.014
	(0.011)	(0.011)	(0.013)	(0.008)	(0.008)	(0.010)
Closeness father (chld.)	-0.002	-0.003	0.007	0.001	-0.004	-0.006
	(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.007)
Absent parent (chld.)	0.012**	0.015**	0.013**	0.006	0.005	0.006
	(0.005)	(0.006)	(0.006)	(0.008)	(0.008)	(0.008)
Bad health (chld.)	0.019**	0.016*	0.014	0.041***	0.030***	0.024***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)
Lesbian or gay		0.029*	0.031*		0.011	0.007
		(0.017)	(0.019)		(0.022)	(0.021)
Bisexual		0.003	0.003		0.033**	0.022*
		(0.011)	(0.011)		(0.013)	(0.012)
Other sexual orient.		0.097***	0.078***		-0.005	-0.007
		(0.030)	(0.029)		(0.023)	(0.022)
DK/PNS		-0.023	-0.014		0.001	0.006
		(0.015)	(0.020)		(0.014)	(0.018)
Few friends (chld.)			-0.007			-0.009
			(0.009)			(0.010)
Loneliness (UCLA)			0.004**			0.013***
			(0.002)			(0.002)
Other controls:						
Age and gender	Yes	Yes	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic	No	Yes	Yes	No	Yes	Yes
Network and social act.	No	No	Yes	No	No	Yes
N. Observations	22774	21365	19360	22872	21445	19409

The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

but may also relates to problematic patterns of use that impact daily functioning. The results in Tables 5 and 6 suggest that early-life conditions are positively related to neglect of work, school, or family responsibilities due to social media overuse and the likelihood of turning to social media in order to improve the general mood and feel better. Having been exposed to alcohol abuse, disability, or mental health problems of close relatives translates into a higher probability of neglecting work and

Table 5 Consequences and purposes of social media use and relationship quality with parents

	(1) Neglect	(2) Neglect	(3) Neglect	(4) F.bett	(5) F.bett	(6) F.bett
Closeness mother (chld.)	0.009	0.007	-0.002	0.021**	0.017**	0.011
	(0.009)	(0.009)	(0.010)	(0.008)	(0.008)	(0.008)
Closeness father (chld.)	-0.013	-0.013	-0.013	0.008	0.003	0.002
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)	(0.013)
Absent parent (chld.)	0.013*	0.016**	0.009	0.002	-0.002	-0.006
	(0.008)	(0.007)	(0.008)	(0.007)	(0.007)	(0.008)
Bad health (chld.)	0.067***	0.051***	0.030***	0.058***	0.046***	0.029***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Lesbian or gay		-0.017	-0.023		0.007	0.000
		(0.014)	(0.015)		(0.019)	(0.015)
Bisexual		0.010	0.000		0.020	0.011
		(0.013)	(0.010)		(0.014)	(0.015)
Other sexual orient.		0.003	0.003		0.007	-0.001
		(0.030)	(0.027)		(0.034)	(0.032)
DK/PNS		0.007	0.003		0.008	0.012
		(0.024)	(0.022)		(0.017)	(0.018)
Few friends (chld.)			0.006			-0.002
			(0.009)			(0.012)
Loneliness (UCLA)			0.029***			0.031***
			(0.001)			(0.002)
Age and gender	Yes	Yes	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic	No	Yes	Yes	No	Yes	Yes
Network and social act.	No	No	Yes	No	No	Yes
N. Observations	22787	21370	19363	22790	21380	19370

The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: *$p <$ 0.1, **$p < 0.05$, ***$p < 0.01$

family duties due to excessive social media use. These associations shrink when loneliness and social isolation are taken into account, which, again, may suggest that the impact of childhood conditions is indirect and passes through experiences of loneliness in adulthood. Similarly, accounting for loneliness absorbs the effects of social isolation and bad health in childhood, which are among the factors affecting loneliness (Casabianca and Kovacic, 2024; Kovacic et al., 2024; Schnepf et al., 2024). The effects of mental health illnesses and alcohol abuse within households are

Table 6 Consequences and purposes of social media use and adverse familial environments

	(1) Neglect	(2) Neglect	(3) Neglect	(4) F.bett	(5) F.bett	(6) F.bett
Illness relatives (chld.)	0.055***	0.044***	0.023***	0.024**	0.019*	0.009
	(0.009)	(0.008)	(0.009)	(0.010)	(0.010)	(0.011)
Mental relatives (chld.)	0.039***	0.033***	0.022**	0.074***	0.070***	0.061***
	(0.014)	(0.012)	(0.011)	(0.011)	(0.011)	(0.012)
Drink relatives (chld.)	0.022***	0.022***	0.011	0.027**	0.026**	0.022**
	(0.008)	(0.008)	(0.007)	(0.010)	(0.011)	(0.011)
Absent parent (chld.)	0.004	0.008	0.003	0.001	-0.004	-0.007
	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)
Bad health (chld.)	0.050***	0.036***	0.018**	0.046***	0.036***	0.020***
	(0.009)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)
Lesbian or gay		-0.019	-0.023		-0.000	-0.006
		(0.013)	(0.014)		(0.016)	(0.013)
Bisexual		-0.000	-0.007		0.012	0.005
		(0.012)	(0.010)		(0.013)	(0.013)
Other sexual orient.		-0.011	-0.004		-0.012	-0.010
		(0.029)	(0.027)		(0.033)	(0.031)
DK/PNS		0.013	0.007		0.004	0.007
		(0.023)	(0.022)		(0.016)	(0.019)
Few friends (chld.)			0.004			-0.002
			(0.009)			(0.012)
Loneliness (UCLA)			0.028***			0.030***
			(0.001)			(0.002)
Other controls:						
Age and gender	Yes	Yes	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic	No	Yes	Yes	No	Yes	Yes
Network and social act.	No	No	Yes	No	No	Yes
N. Observations	22793	21401	19402	22779	21393	19392

The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

even more pronounced in the case of the use of social media as a coping tool to feel better. The marginal effect of using digital tools to improve the mood is double with respect to work and family duties neglect. In addition, this specific purpose of social media use is significantly correlated with lower emotional closeness with parents,

especially regarding poorer relationship quality with mothers during childhood (Table 5). This association, however, vanishes when we account for loneliness and social isolation, which is not surprising since poor relationship quality with parents is strongly correlated with feelings of loneliness in adulthood (Casabianca and Kovacic, 2024; Guthmuller, 2022; Kovacic et al., 2024).

The fact that childhood adverse family environments contribute to greater social media consumption in adulthood is particularly salient since balanced engagement with social media platforms is an important factor that may shape the individuals' healthy psychosocial development. According to the digital Goldilocks hypothesis (Przybylski and Weinstein, 2017, 2019; Przybylski et al., 2020), moderate social media use may yield beneficial outcomes while excessive use may be detrimental.

Moreover, since the effects of early-life conditions are relatively stronger at younger ages compared to the rest of the life course (Kovacic and Orso, 2022), the exposure to some adverse events during childhood associated with an increased intensity of social media use in adulthood may be particularly problematic for the mental well-being of younger individuals (Allcott et al., 2020; Braghieri et al., 2022; Cabeza Martínez et al., 2025).

In addition to the time spent on digital platforms and the type of use and its consequences presented in Tables 1 to 6, Table 7 introduces an additional indicator of social media behaviour: addiction to digital platforms. This measure is constructed by interacting the intensive use of social networking sites with three factors: (1) the type of social media use (active versus passive), (2) the frequent neglect of work and family responsibilities due to time spent on social media, and (3) the use of social media as a means to improve mood and overall satisfaction. These interactions are intended to capture a more severe and potentially problematic form of attachment to social media. The results are aligned to those presented so far. Having been raised in proximity to close relatives with severe mental illnesses and/or drinking problems significantly increases the likelihood of intense passive use of social media, as well as social media addiction, with serious consequences in terms of neglecting work and family duties and using social media as a psychological coping strategy to improve overall mood and satisfaction. Moreover, frequent experiences of loneliness, although statistically significant across all model specifications, show a somewhat stronger association with intense passive use and its related negative effects in terms of neglect. Compared to the results in Table 6, proximity to close relatives with severe drinking problems significantly increases the likelihood of addictive social media use with detrimental consequences for professional and family life (neglect).

We conclude the main results section by considering the full range of responses to the questions on the frequency of social networking site and instant messaging use, passive versus active use of social networks, as well as on neglecting work and family duties and feeling better, instead of relying on binary indicators. Moreover, we consider an alternative four-hour cut-off for social networking sites and instant messaging use. This additional set of estimations helps to address any remaining concerns related to the potentially arbitrary nature of dichotomised variables. The coefficients from the ordered logit model in Table 11 (in the appendix), as well as for alternative cut-off in Table 12 and Table 13 confirm the robustness of our findings.

Unlike binary logit models, which capture effects related to an individual's use beyond a predefined threshold, ordered logit models account for incremental shifts

Table 7 Addiction to social media and adverse familial environments

	(1) Active Intense	(2) Passive Intense	(3) Neglect Intense	(4) F.bett Intense
Illness relatives (chld.)	0.016***	0.011*	0.011*	0.014**
	(0.005)	(0.006)	(0.006)	(0.006)
Mental relatives (chld.)	0.012	0.014	0.016**	0.027***
	(0.008)	(0.009)	(0.007)	(0.006)
Drink relatives (chld.)	0.005	0.022***	0.015***	0.018***
	(0.005)	(0.005)	(0.005)	(0.005)
Absent parent (chld.)	0.005	-0.000	-0.001	-0.008*
	(0.004)	(0.005)	(0.004)	(0.005)
Bad health (chld.)	-0.002	0.010*	0.008	0.005
	(0.005)	(0.005)	(0.006)	(0.005)
Lesbian or gay	0.017	-0.004	-0.006	-0.010
	(0.015)	(0.015)	(0.010)	(0.009)
Bisexual	0.006	0.008	-0.003	0.007
	(0.010)	(0.012)	(0.009)	(0.009)
Other sexual orient.	0.056***	0.018	0.020	0.033*
	(0.021)	(0.017)	(0.016)	(0.020)
DK/PNS	0.008	-0.000	0.001	0.007
	(0.013)	(0.018)	(0.012)	(0.011)
Few friends (chld.)	-0.001	-0.010	-0.002	0.001
	(0.005)	(0.006)	(0.007)	(0.006)
Loneliness (UCLA)	0.005***	0.009***	0.013***	0.016***
	(0.001)	(0.002)	(0.001)	(0.001)
Other controls:				
Age and gender	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes
Socio-economic	Yes	Yes	Yes	Yes
Network and social act.	Yes	Yes	Yes	Yes
N. Observations	19362	19413	19382	19373

The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: *$p <$ 0.1, **$p < 0.05$, ***$p < 0.01$

across the entire range of engagement levels. This allows for detecting more gradual patterns, such as ACE increasing the likelihood of more frequent (though not necessarily extreme) social media use. This difference in sensitivity may explain why the coefficients for ACE are statistically significant in the ordered logit specification (for example, for the active use indicator) but not in the binary logit model.

The next subsection will explore in detail the associations between childhood conditions and social media use across age groups, as well as by gender and European macro regions, revealing some interesting cohort effects and geographical patterns.

4.2 ACE and social media use: heterogeneous effects

Figures 8 and 9 report the coefficients (expressed as percentage point differences) of emotional closeness and adverse childhood environments on social media overuse and the related work and family duties neglect by age group. Having been raised with close relatives affected by mental health issues or alcohol abuse significantly influences the social networking sites overuse by younger individuals (those aged 35 or younger). Familial heavy drinking and the presence of severe chronic illnesses also affect individuals aged 35-50. Younger individuals with experiences of drinking or mental health problems in the household during childhood are also more likely to engage in passive social media use compared to their older counterparts. This is particularly interesting given the strong associations between passive social media use and emotional distress among young individuals, as documented by Cabeza Martínez et al. (2025), and the evidence that the effects of ACEs are generally more pronounced at younger ages (Kovacic and Orso, 2022).

When it comes to potential heterogeneous effects of adverse childhood conditions by gender, the picture becomes more complex. The results in Figures 10 and 11 (in the appendix) suggest that male individuals are generally more affected by negative spillovers of adverse environments in childhood compared to females. Exposure to severe drinking problems of close relatives during childhood associates more strongly with social networking sites overuse and passive engagement for men than for women, although these differences are not significant. Severe illnesses, mental health problems, and adverse relationships with mothers, on the other hand, correlate with passive social media consumption only for men, while for females they are not significantly different from zero. While the literature on direct evidence linking ACE to social media use with a gender perspective is still very limited, some research suggests that men with childhood adversities may be more prone to internet addiction in adolescence and adulthood, while females may experience higher rates of cyberbullying (Mlouki et al., 2024; Raney et al., 2023; Varchetta et al., 2024). The authors suggest that this may be due to different coping mechanisms, with males being more likely to engage in solitary and generally anonymous online behaviours (like gaming or passive scrolling) to avoid emotional distress, while females often use the internet as a tool for emotional expression and social connection. Moreover, societal norms often discourage the externalisation of vulnerability, especially for men, making them more likely to seek emotional support offline. This, in combination with a general tendency to use social media in an immersive and anonymous way rather than as an "emotional outlet," which is more prevalent among women,

makes men more likely to engage in an excessive passive use of social media. Further research is needed to better understand these dynamics and inform targeted interventions.

A closer look at potential differences at the regional level reveals some interesting patterns that complement the stylised facts documented in Figures 6 and 7 (in the appendix). Figure 12 (in the appendix) shows the coefficients of our main childhood variables for four European macro regions: Northern, Eastern, Western, and Southern Europe.[16] The effects of heavy drinking by close relatives appear particularly pronounced in Northern and Eastern European countries, where the reported incidence of these experiences is highest (see Figure 6, in the appendix). Similar evidence is found for close relatives' mental health issues. Northern and eastern European countries are also those registering the highest deviations of individuals' response times on ACE, which may indicate that, in addition to a relatively higher incidence of ACE, this phenomenon represents a particularly delicate issue for affected respondents (Figure 7, in the appendix). Interestingly, low relationship quality with parents (especially mothers) appears to be more relevant across Southern and Western European countries, at least for SNS and passive social media consumption. This latter result may reflect significantly higher degrees of collectivism in southern European cultures, as opposed to more individualistic societies in the north, characterised by stronger independence and looser familial networks (Hofstede et al., 2010; Schulz, Bahrami-Rad, Beauchamp and Henrich, 2019).

Finally, to show to what extent the social desirability bias affects the results, in Figure 13 we compare the coefficients of our main adverse childhood conditions with and without accounting for the corresponding chronometric effects (time to response). When potential reporting biases are considered, the associations between adverse childhood environments and social media consumption in adulthood become stronger. This is particularly relevant for heavy drinking in the case of SNS and passive social media use and relatives' mental health issues in the model for IMT and social media overuse aimed at improving mood and satisfaction. Interestingly, omitting individual response times would make the coefficient of relatives severe illness statistically insignificant, while low closeness to mothers would shift from positive to negative, remaining, however, statistically not different from zero. This is an interesting result, since the existing literature has mainly focused on the determinants and effects of desirability bias on non-response rates to the sensitive questions, such as ACE, rather than individual-specific response times (Grigsby et al., 2024).

Previous evidence offered a first insight into significant associations between adverse childhood environments and social media use later in life. Moreover, the results suggest that loneliness and social isolation reduce the effects of some experiences, such as heavy drinking and mental health illness within households, making the relationship between early-life adversity and subsequent digital behaviour patterns even more puzzling. In what follows, we explore the existence of possible indirect pathways of ACE operating through mediating factors. For the sake of clarity, we will focus only on adverse familial environments since emotional closeness with parents revealed to be a relatively weaker predictor of social media overuse.

[16] Countries belonging to each macro region are reported in the figures' notes.

4.3 ACE and social media use: potential mediators

People reporting adverse events in childhood often show increased frequency of social media use as a basic coping mechanism. One reason for such behaviours may lie in the fact that being exposed to adverse environments in early life can impair cognitive and emotional processes essential for self-regulation, self-esteem, and decision-making (Boullier and Blair, 2018). These disruptions may subsequently reinforce maladaptive coping behaviours and increase the risk of developing addictions (Chaudhary, Walia, Devi, Yadav and Saraswathy, 2024). Feelings like loneliness and social isolation, which are strongly related to emotional processes, may serve as potential mediators that link ACE and social media consumption. Indeed, ACE are often associated with a more frequent reporting of loneliness and social disconnection (Guthmuller, 2022; Kovacic et al., 2024; Tzouvara et al., 2023), feelings that in turn may shape how individuals engage with social media. This mediated pathway might result in compensatory behaviours where people intensively use social media to fill their social gaps. Reliance on online connections, while providing temporary comfort, can lead to a progressive detachment from reality that undermines the development of crucial offline social skills and interpersonal relationships.

In order to test these potential pathways, in what follows we show the results of the mediation analysis, where the effects of the most important early-life predictors of intensive social media use evidenced in the previous section, namely being raised in the presence of close relatives with severe drinking problems or mental health issues, are passed through current loneliness experiences and aspects of individuals' social connectedness. More precisely, we report three different effects. The direct effect refers to the coefficient of ACE from the model including the potential mediator (loneliness or social connectedness). This effect quantifies the impact of ACE on social media use, holding constant the influence of the mediator. The total effect, on the other hand, captures the association between ACE and social media without accounting for potential mediators. Finally, the indirect effect represents the difference between the total and direct effects. This latter quantifies the extent to which the relationship between ACE and the outcome is channelled through the mediator.[17]

Table 8 shows the results when the mediator is loneliness [18]. The coefficients indicate that 20% (10.5%) of the total effect of parental mental illness (heavy drinking) on intensive social network sites use passes through loneliness. The effect

[17] Statistically significant indirect effects suggest that part of the total effect of ACE passes through the mediator. Direct effects, on the other hand, may also be statistically not different from zero, indicating that there is no independent effect of specific adverse conditions considered on social media use. This, however, does not exclude the possibility of significant indirect effects since the mediator may fully explain the association between ACE variables and social media use, underscoring its crucial role in shaping the outcomes related to digital engagement.

[18] When we compare the total effects obtained from the KHB method with those from the standard logit regression (e.g., coefficients in Table 1 and 2), we notice some differences. First, the sample sizes are not the same. This discrepancy arises because the KHB command only includes observations with complete data for all variables, including the mediator, when estimating both the direct and total effects. In contrast, the standard logit regression does not account for the mediator and its potential missing values when estimating the total effect, resulting in a larger sample size. Consequently, this reduction in sample size may also lead to small differences in the magnitude of the total effect coefficients between the standard logit model and the KHB model.

of parental mental issues on instant messaging, on the other hand, is mediated by 15% by loneliness, while adverse childhood environments appear not to have any direct effect. This is in line with the evidence reported in Tables 1 and 2, which show how the inclusion of loneliness in the model weakens the relationship between mental health and drinking problems of close relatives during childhood and social media overuse in adulthood.

Loneliness appears as an important mediator also for passive users of digital advice. Indeed, 22.7% of the effect of parental mental illness runs through individuals' experiences of loneliness. This mediating effect is significantly lower for parental alcohol abuse (11.1%). At the same time, we do not observe any significant effect for active use, which is in line with the results from Tables 4 and 3. Finally, regarding the effects of mental illness and excessive drinking on attitudes toward neglecting work and family duties due to excessive use of social media, loneliness results even more powerful in channelling the effects of ACE. Indeed, 34.2% (29.1%) of the total effect of mental illness (excessive drinking) is mediated by loneliness. These shares are somewhat lower (around 16-25%) in the case of the use of social media with the purpose of improving the overall mood and satisfaction.

Other potentially relevant mediators are given by the indicators of social connectedness, namely the network size (number of close family members and friends) and the frequency of face-to-face contacts with friends and family. Here we employ the index of social connectedness described in Section 2.3 as a proxy for social and familial contacts of respondents. Table 9 shows that lower social isolation positively mediates detrimental effects of parental mental illness and alcohol abuse, although these effects appear on average less pronounced compared to those observed for loneliness.

The benevolent effect of larger and efficient networks is particularly pronounced for instant messaging tools (50%) in the case of parental heavy drinking. However, neither the direct effect nor the total effect of drinking is statistically different from zero, which is in line with the results in Table 2, column 6. This suggests that parental alcohol abuse may indirectly influence intense IMT use through social connectedness. This finding reinforces the importance of the mediator's intermediary, which "absorbs" the effect of parental alcohol abuse. Social connectedness has also been identified as an important mediator of the effect of close relatives' mental health illnesses on instant messaging (10.5%).

An interesting picture emerges when looking at active versus passive use of social media. For active social media use, only indirect effects are statistically different from zero, indicating that the effect of childhood adversities is fully mediated by social connectedness. Parental mental health issues and alcohol abuse, therefore, indirectly reduce active social media use through the intensity of social connections as measured by the social connectedness index. For passive use, on the other side, the evidence is in line with previous mediation results in Table 8: social connectedness, as loneliness, appears to be a significant mediator for mental and drinking behaviours among close relatives, reducing the total effects by 5.8% and 6.8%, respectively. Finally, regarding social media behaviours (neglecting work, school, or family obligations due to social media use and using social media to improve mood), we observe that, unlike the case where loneliness was the mediator, no significant social connectedness mediating effects are found for both the outcomes.

Table 8 Mediation analysis

	SNS (Mental)	SNS (Drink)	IMT (Mental)	IMT (Drink)
Indirect effect	0.006***	0.004***	0.003***	0.002***
	(0.007)	(0.005)	(0.008)	(0.006)
Direct effect	0.024*	0.034***	0.017	0.005
	(0.108)	(0.063)	(0.114)	(0.062)
Total effect	0.030**	0.038***	0.020*	0.007
	(0.108)	(0.063)	(0.114)	(0.064)
% effect mediated	**20.0**	**10.5**	**15.0**	**28.5**
N. Observations	21200	21200	21185	21185
	Active (Mental)	Active (Drink)	Passive (Mental)	Passive (Drink)
Indirect effect	0.001	0.000	0.005***	0.003***
	(0.008)	(0.005)	(0.008)	(0.006)
Direct effect	0.017	0.012	0.017*	0.025***
	(0.111)	(0.069)	(0.076)	(0.053)
Total effect	0.018	0.012	0.022**	0.027***
	(0.113)	(0.071)	(0.077)	(0.052)
% effect mediated	—	—	**22.7**	**11.1**
N. Observations	21056	21056	21122	21122
	Neglect (Mental)	Neglect (Drink)	F.bett (Mental)	F.bett (Drink)
Indirect effect	0.012***	0.007***	0.012***	0.007***
	(0.012)	(0.009)	(0.012)	(0.009)
Direct effect	0.024*	0.017**	0.061***	0.021**
	(0.095)	(0.057)	(0.084)	(0.076)
Total effect	0.035***	0.024***	0.072***	0.028***
	(0.095)	(0.057)	(0.083)	(0.076)
% effect mediated	**34.2**	**29.1**	**16.6**	**25.0**
N. Observations	21077	21077	21067	21067
Other controls:				
Age and gender	Yes	Yes	Yes	Yes
Socio-economic	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes
Network and social act.	No	No	No	No

Mediator: loneliness.

Mediation Analysis. The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

Table 9 Mediation analysis

	SNS (Mental)	SNS (Drink)	IMT (Mental)	IMT (Drink)
Indirect effect	-0.001**	-0.001***	-0.002**	-0.002***
	(0.003)	(0.003)	(0.007)	(0.006)
Direct effect	0.027*	0.038***	0.021*	0.006
	(0.118)	(0.061)	(0.112)	(0.061)
Total effect	0.026*	0.036***	0.019*	0.004
	(0.118)	(0.061)	(0.111)	(0.059)
% effect mediated	**3.8**	**2.7**	**10.5**	**50.0**
N. Observations	19788	19788	19782	19782
	Active (Mental)	Active (Drink)	Passive (Mental)	Passive (Drink)
Indirect effect	-0.003**	-0.003***	-0.001**	-0.002***
	(0.011)	(0.009)	(0.005)	(0.004)
Direct effect	0.020	0.015*	0.018*	0.030***
	(0.123)	(0.075)	(0.088)	(0.051)
Total effect	0.018	0.012	0.017	0.029***
	(0.123)	(0.075)	(0.088)	(0.050)
% effect mediated	**16.6**	**2.5**	**5.8**	**6.8**
N. Observations	19676	19676	19735	19735
	Neglect (Mental)	Neglect (Drink)	F.bett (Mental)	F.bett (Drink)
Indirect effect	-0.000	-0.000	-0.001	-0.001*
	(0.002)	(0.003)	(0.003)	(0.003)
Direct effect	0.035***	0.021**	0.072***	0.030***
	(0.087)	(0.065)	(0.087)	(0.076)
Total effect	0.035***	0.021**	0.071***	0.029***
	(0.087)	(0.064)	(0.087)	(0.076)
% effect mediated	-0.0	-0.0	1.4	**3.4**
N. Observations	19699	19699	19687	19687
Other controls:				
Age and gender	Yes	Yes	Yes	Yes
Socio-economic	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes
Network and social act.	No	No	No	No

Mediator: Social Connectedness.

Mediation Analysis. The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

5 Conclusions

This paper explored an important topic, namely the potential relationship between ACE and social media use later in life. The existence of such a relationship may be particularly concerning since there is solid evidence that adverse childhood trauma and social media overuse both harm individuals' well-being and cognitive development. Using the rich information from a novel EU-wide survey, we show that these two factors are interconnected. More precisely, individuals whose close relatives suffered from severe drinking or mental health problems are significantly more likely to spend more than 2 hours per day on social networking sites, use social media more passively, and, as a consequence, neglect work and family duties more often compared to their counterparts who spend less time on digital platforms. Our findings also reveal gender and regional differences. Severe illnesses, mental health problems, and adverse relationships with mothers correlate with passive social media consumption only for men, while for females they are not significantly different from zero. Furthermore, having been raised with close relatives affected by mental health issues or alcohol abuse significantly influences the social networking sites overuse by younger individuals (those aged 35 or younger). Finally, we document some interesting regional disparities, with alcohol abuse among close relatives influencing social media overuse in Nordic and Eastern Europe, whereas emotional closeness to the mother plays a pivotal role in Southern Europe. These specific patterns emphasise the importance of considering cultural and social contexts when addressing the long-term effects of childhood adversity.

We also highlight that the detrimental effect of adverse experiences in early life is mediated through feelings of loneliness and social isolation in adulthood. Loneliness mediates about 25% of the effect of mental illnesses in the household during childhood on social networking sites overuse, 30.4% of its effect on passive social media use, and up to 43% in the case of neglecting work or family duties due to excessive social media consumption. The mediating effect of loneliness is less pronounced for social media use aimed at improving mood and satisfaction, while the mediating effect of social connectedness, though statistically significant, shows reduced magnitude. This result adds to a growing literature showing that loneliness and/or social isolation may be harmful for individuals' mental and physical health conditions. Finally, our results also suggest that some vulnerable groups are particularly at risk of overusing social media. Among LGB+ individuals, bisexuals are significantly more engaged in passive social networking, while gay and lesbian people are more active and rely more on instant messaging tools.

There is a growing interest among policymakers to regulate social media use, especially among younger individuals. The European Digital Act Service, which entered into force in 2023 to protect European users when it comes to privacy, transparency, and removal of harmful or illegal content, and the recent ban imposed by the Australian government for social media use for children below 16 are only some of the initiatives undertaken by governments and regulators. This argument gains additional importance in light of the evidence that negative effects of social media use may be more pronounced for individuals with a higher baseline risk of developing emotional disorders, which, according to a wide medical and epidemiological literature, are also those who were exposed to early-life trauma.

The evidence reported in this research underscores the urgent need for interventions aimed at mitigating the adverse impacts of ACE. Programs that promote emotional support, strengthen social connectedness, and reduce loneliness could play a critical role in breaking the cycle of maladaptive coping strategies. Schools, healthcare systems, and social services should collaborate to identify at-risk individuals early and provide targeted support to build resilience. This study also highlights the broader societal implications of excessive social media use as a digital coping mechanism. The intersection of ACE and digital behaviour needs further exploration, particularly in understanding how digital platforms might exacerbate or mitigate mental health challenges. The interplay between adverse childhood environments, loneliness, and excessive social media use represents a significant public health challenge. Addressing these interconnected issues requires a multifaceted approach that combines preventive measures and targeted interventions to foster healthier digital habits and enhance well-being across the life course.

In conclusion, while this study provides valuable insights, it is not without limitations. First, cross-sectional data does not allow to draw causal inference: coefficients, therefore, can be interpreted only as associations and not as independent causal effects. A further limitation concerns the nature of the variables employed in the analysis, which are self-reported by respondents. This may introduce reporting bias due to recall error or social desirability, potentially affecting the reliability and precision of the estimates. We attempt to address this issue by introducing time response variables, as described in the introduction, which serve as a proxy to adjust for potential biases linked to social desirability in survey self-reported responses. Regarding ACE variables, we acknowledge that our data includes only a subset of the more comprehensive list of adverse childhood experiences commonly used in epidemiological and medical research (e.g., Felitti et al., 1998, among others). This means we cannot capture all potential adverse events individuals may have been exposed to during childhood, but rather a proxy for the broader context of their living conditions up to the age of 16. It is also important to note that the EU-LS survey was conducted in 2022, shortly after the third wave of the COVID-19 pandemic. The pandemic, along with the associated periods of social isolation and physical distancing, introduced additional stressors that may have further intensified the existing vulnerabilities of individuals with a history of adverse childhood experiences, particularly in relation to emotional disorders and physical comorbidities.

Data Availability Full dataset available online.

Code availability Available upon reasonable request.

Author contributions Both authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by both authors. The manuscript was written by both authors. Both authors read and approved the final manuscript.

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Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest.

6 Appendix

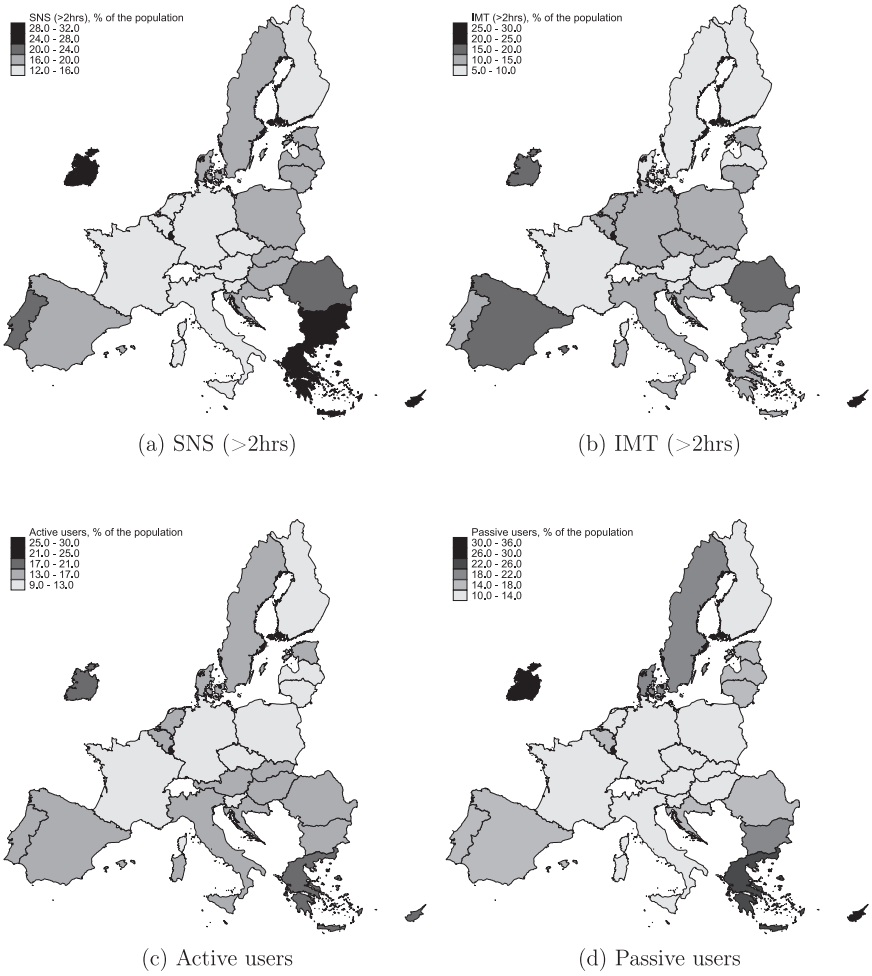
Table 10, Figs. 5, 6, 7, Tables 11, 12, 13, Figs. 8, 9, 10, 11, 12, 13

Table 10 Summary statistics

Variable	Mean	Std. Dev.	Min	Max	Obs
SNS (>2hrs)	0.183	0.387	0	1	24220
IMT (>2hrs)	0.124	0.329	0	1	24193
Active user	0.142	0.349	0	1	23983
Passive user	0.166	0.372	0	1	24103
Neglect work/family	0.178	0.383	0	1	24004
Feel better	0.181	0.385	0	1	24003
Age	44.475	14.983	16	80	24253
Age < 30	0.202	0.401	0	1	24253
Age 30-40	0.225	0.418	0	1	24253
Age 40-50	0.221	0.415	0	1	24253
Age 50-60	0.183	0.387	0	1	24253
Age > 60	0.168	0.374	0	1	24253
Female	0.52	0.5	0	1	24342
Closeness mother (chld.)	0.112	0.315	0	1	23832
Closeness father (chld.)	0.205	0.403	0	1	23714
Absent parent (chld.)	0.204	0.403	0	1	24081
Bad health (chld.)	0.107	0.31	0	1	24342
Few friends (chld.)	0.108	0.31	0	1	24197
Illness relatives (chld.)	0.128	0.334	0	1	23702
Mental relatives (chld.)	0.112	0.315	0	1	23702

Table 10 continued

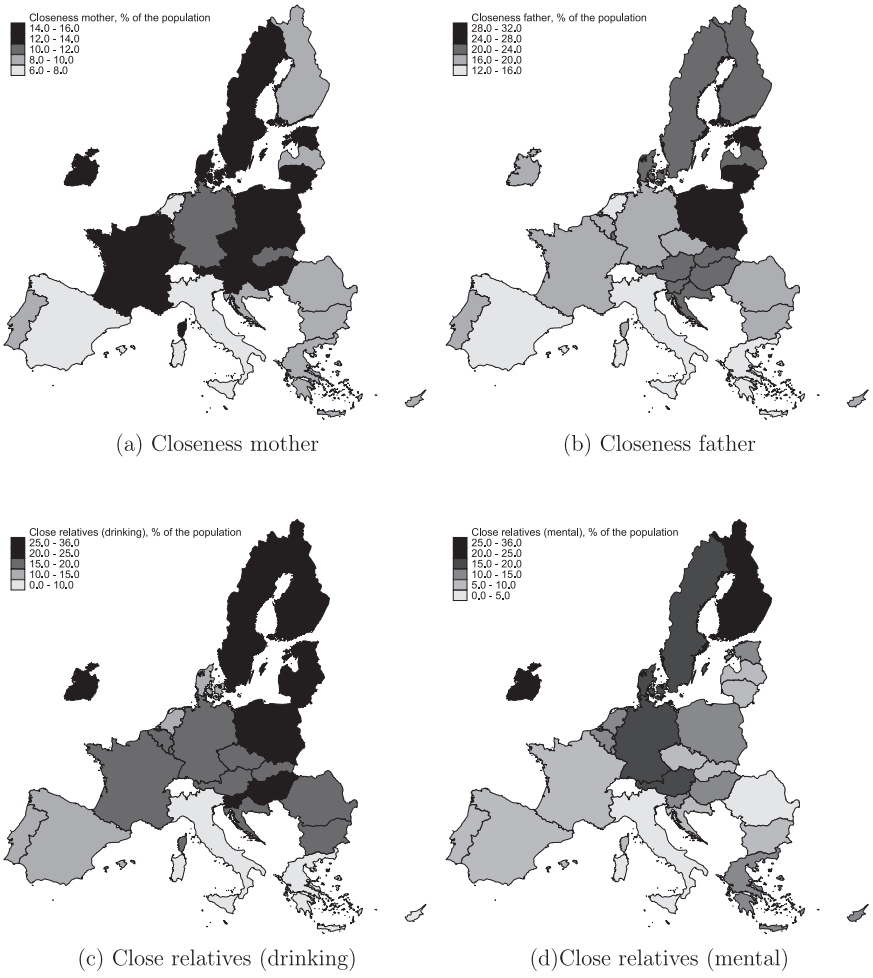
Variable	Mean	Std. Dev.	Min	Max	Obs
Drink relatives (chld.)	0.194	0.396	0	1	23702
ACE index	0.948	1.182	0	6	22968
ACE index (≥3)	0.116	0.32	0	1	22968
Household's size	2.235	1.066	1	10	24263
No kids	0.353	0.478	0	1	24342
Kids outside the hh	0.168	0.374	0	1	24342
Kids in the hh	0.367	0.482	0	1	24342
Kids both in and outside hh	0.112	0.316	0	1	24342
Immigrant	0.082	0.275	0	1	24342
Smoking	0.21	0.407	0	1	24118
Poor diet	0.488	0.5	0	1	24052
Ph. inactivity	0.173	0.378	0	1	23092
Employed	0.655	0.475	0	1	24342
Married (or in relat.)	0.685	0.464	0	1	24235
SAH	0.138	0.345	0	1	24220
Religious	0.259	0.438	0	1	24342
Frequency friends	0.239	0.426	0	1	24074
Frequency family	0.27	0.444	0	1	24095
N. close family members	4.509	3.526	0	25	22863
N. close friends	3.795	3.376	0	25	22622
Cultural/sport events	0.185	0.388	0	1	24125
Loneliness (UCLA)	1.991	1.851	0	6	23837
Heterosexual/straight	0.89	0.313	0	1	24342
Lesbian or gay	0.025	0.155	0	1	24342
Bisexual	0.039	0.193	0	1	24342
Other sexual orientation	0.01	0.098	0	1	24342
DK/PNS	0.037	0.189	0	1	24342
Mean time (selected)	6.22	5.142	1.333	60	24120
Time clos. (dev.)	6.379	8.853	-60	60	24016
Time clos. (dev.), SQ	119.063	281.137	0	3600	24016
Time relatives (dev.)	6.957	9.436	-58.667	60	23978
Time relatives (dev.), SQ	137.45	308.341	0	3600	23978



(a) SNS (>2hrs) (b) IMT (>2hrs)

(c) Active users (d) Passive users

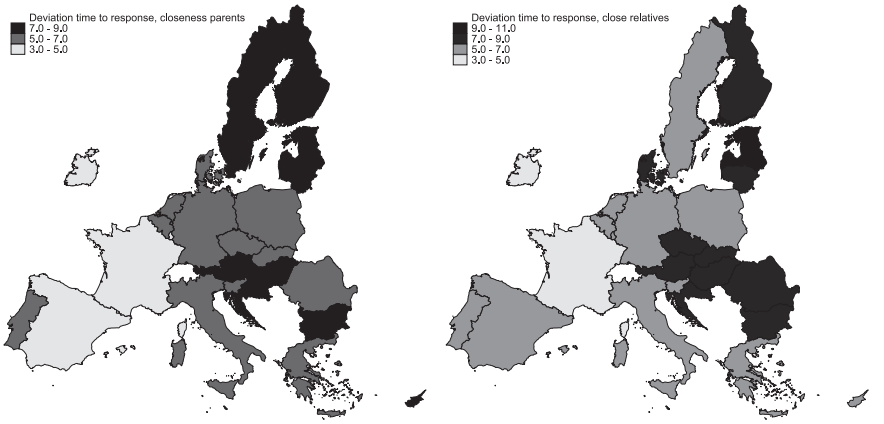
Fig. 5 Social media consumption (%), 27 EU member states. (**a**) SNS (>2hrs) (**b**) IMT (>2hrs) (**c**) Active users (**d**) Passive users Source: EU-LS 2022



(a) Closeness mother (b) Closeness father

(c) Close relatives (drinking) (d)Close relatives (mental)

Fig. 6 Adverse childhood conditions (%), 27 EU member states. (**a**) Closeness mother (**b**) Closeness father (**c**) Close relatives (drinking) (**d**) Close relatives (mental) Source: EU-LS 2022



(a) Closeness parents (b) Close relatives

Fig. 7 Average deviation of time to response of ACE, 27 EU member states. (**a**) Closeness parents (**b**) Close relatives Source: EU-LS 2022

Table 11 Social Network Sites (SNS), Instant Messaging Tools (IMT) and consequences and purposes of social media use, and adverse familial environments

	(1) SNS (cat)	(2) IMT (cat)	(3) Passive (cat)	(4) Active (cat)	(5) Neglect (cat)	(6) F.bett (cat)
Illness relatives (chld.)	0.097**	0.187***	0.112***	0.317***	0.230***	0.098*
	(0.046)	(0.072)	(0.043)	(0.060)	(0.059)	(0.055)
Mental relatives (chld.)	0.102	0.106	0.160***	0.141**	0.248***	0.249***
	(0.074)	(0.074)	(0.052)	(0.072)	(0.070)	(0.059)
Drink relatives (chld.)	0.184***	0.093*	0.142***	0.150***	0.177***	0.139***
	(0.053)	(0.050)	(0.046)	(0.045)	(0.051)	(0.047)
Absent parent (chld.)	0.056**	0.110***	0.062	0.124***	-0.048	-0.037
	(0.028)	(0.031)	(0.040)	(0.035)	(0.043)	(0.039)
Bad health (chld.)	0.065	0.014	0.107*	0.017	0.088	0.109**
	(0.067)	(0.059)	(0.060)	(0.060)	(0.056)	(0.053)
Lesbian or gay	0.160	0.250***	0.095	0.217**	-0.003	0.190***
	(0.097)	(0.091)	(0.129)	(0.089)	(0.104)	(0.051)
Bisexual	0.096	0.033	0.013	-0.015	0.020	0.127**
	(0.075)	(0.078)	(0.054)	(0.062)	(0.065)	(0.052)
Other sexual orient.	0.155	0.005	-0.276	0.084	-0.303	-0.101
	(0.138)	(0.163)	(0.173)	(0.173)	(0.189)	(0.160)
Prefer not to say	-0.022	-0.008	-0.146	-0.035	-0.033	0.060
	(0.094)	(0.102)	(0.106)	(0.105)	(0.142)	(0.099)
Few friends (chld.)	-0.172***	-0.195***	-0.212***	-0.103**	-0.111	-0.122*
	(0.051)	(0.049)	(0.060)	(0.045)	(0.068)	(0.069)
Loneliness (UCLA)	0.105***	0.076***	0.103***	0.090***	0.239***	0.274***
	(0.009)	(0.010)	(0.012)	(0.011)	(0.011)	(0.013)
Other controls:						
Age and gender	Yes	Yes	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic	Yes	Yes	Yes	Yes	Yes	Yes
Network and social act.	Yes	Yes	Yes	Yes	Yes	Yes
N. Observations	19481	19475	19460	19404	19402	19392

The method of estimation is Ordered Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

Table 12 Social Network Sites (SNS), Instant Messaging Tools (IMT) and relationship quality with parents: at least four hours per day

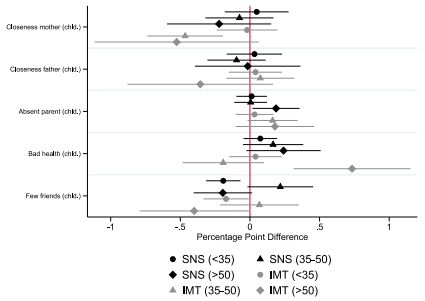
	(1) SNS	(2) SNS	(3) SNS	(4) IMT	(5) IMT	(6) IMT
Closeness mother (chld.)	0.009	-0.001	0.003	-0.000	-0.006	-0.006
	(0.006)	(0.007)	(0.007)	(0.004)	(0.005)	(0.007)
Closeness father (chld.)	0.006	0.007	0.007	-0.008	-0.009	-0.008
	(0.006)	(0.007)	(0.007)	(0.005)	(0.006)	(0.006)
Absent parent (chld.)	0.007	0.002	0.001	0.008**	0.006	0.006
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Bad health (chld.)	0.028***	0.019***	0.012***	0.013***	0.010**	0.004
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Lesbian or gay		0.006	0.008		0.021*	0.024**
		(0.014)	(0.013)		(0.011)	(0.011)
Bisexual		0.007	0.002		0.002	0.001
		(0.010)	(0.010)		(0.009)	(0.009)
Other sexual orient.		0.040**	0.031*		0.025	0.010
		(0.019)	(0.018)		(0.015)	(0.014)
DK/PNS		0.017	0.009		0.029**	0.032**
		(0.013)	(0.012)		(0.012)	(0.014)
Few friends (chld.)			-0.002			-0.006
			(0.007)			(0.005)
Loneliness (UCLA)			0.010***			0.006***
			(0.001)			(0.001)
Other controls:						
Age and gender	Yes	Yes	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic	No	Yes	Yes	No	Yes	Yes
Network and social act.	No	No	Yes	No	No	Yes
N. Observations	22972	21525	19455	22956	21513	19450

The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: *$p <$ 0.1, **$p < 0.05$, ***$p < 0.01$

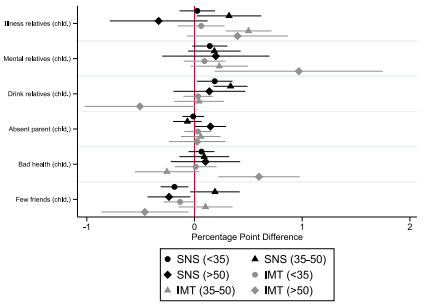
Table 13 Social Network Sites (SNS), Instant Messaging Tools (IMT) and adverse familial environments: at least 4 hours per day

	(1) SNS	(2) SNS	(3) SNS	(4) IMT	(5) IMT	(6) IMT
Illness relatives (chld.)	0.020**	0.017**	0.017**	0.015***	0.014***	0.009*
	(0.008)	(0.008)	(0.008)	(0.006)	(0.005)	(0.005)
Mental relatives (chld.)	0.022***	0.020**	0.016*	0.010	0.009	0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.006)
Drink relatives (chld.)	0.028***	0.023***	0.020***	0.011***	0.009***	0.006**
	(0.005)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)
Absent parent (chld.)	0.005	-0.001	-0.001	0.003	0.002	0.003
	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Bad health (chld.)	0.021***	0.013**	0.008	0.010**	0.007	0.001
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Lesbian or gay		-0.001	0.001		0.015	0.020*
		(0.013)	(0.012)		(0.010)	(0.010)
Bisexual		0.006	-0.000		-0.001	-0.001
		(0.011)	(0.011)		(0.009)	(0.008)
Other sexual orient.		0.029*	0.023		0.027*	0.018
		(0.017)	(0.017)		(0.014)	(0.015)
DK/PNS		0.011	-0.000		0.031**	0.032**
		(0.012)	(0.011)		(0.012)	(0.014)
Few friends (chld.)			-0.002			-0.003
			(0.007)			(0.005)
Loneliness (UCLA)			0.010***			0.006***
			(0.001)			(0.001)
Other controls:						
Age and gender	Yes	Yes	Yes	Yes	Yes	Yes
Response times	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic	No	Yes	Yes	No	Yes	Yes
Network and social act.	No	No	Yes	No	No	Yes
N. Observations	22973	21541	19481	22952	21525	19475

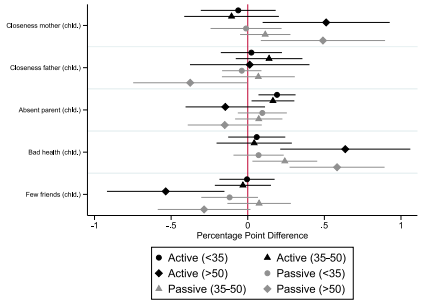
The method of estimation is Logit. The reported coefficients are marginal effects. Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. Response times: average times on neutral questions, deviations of ACE time to response from the mean, interactions between ACE and their respective time to response deviations. In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses. Significance levels: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$



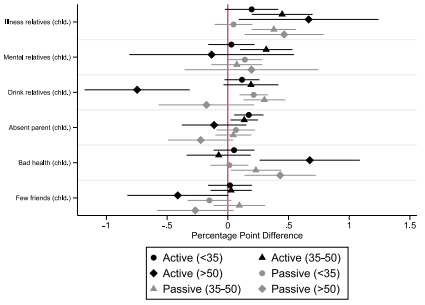
(a) Emotional closeness



(b) Adverse environments

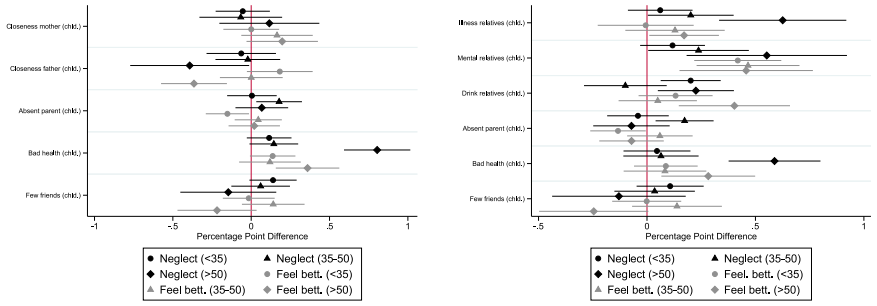


(c) Emotional closeness



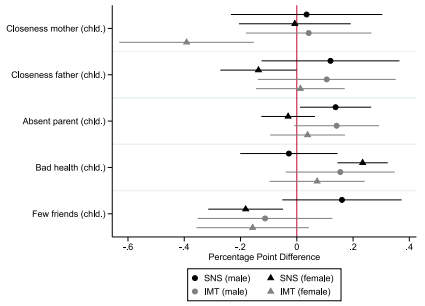
(d) Adverse environments

Fig. 8 Heterogeneous effects of adverse childhood conditions on SNS, IMT and active and passive use of social media, by age group. (**a**) Emotional closeness (**b**) Adverse environments (**c**) Emotional closeness (**d**) Adverse environments. The method of estimation is Logit. The figure depicts marginal effects (expressed as a percentage point difference). All models include: household size, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health, network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). In all models we control for country fixed effects. Standard errors are clustered at the country of residence level

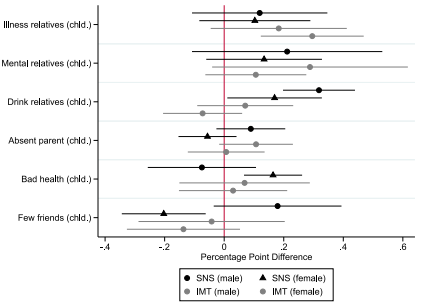


(a) Emotional closeness (b) Adverse environments

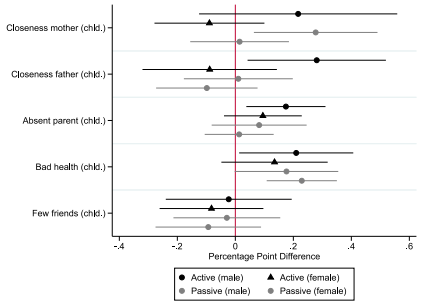
Fig. 9 Heterogeneous effects of adverse childhood conditions on work and family duties neglect and use of social media in order to feel better, by age group. (**a**) Emotional closeness (**b**) Adverse environments. The method of estimation is Logit. The figure depicts marginal effects (expressed as a percentage point difference). All models include: household size, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health, network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses



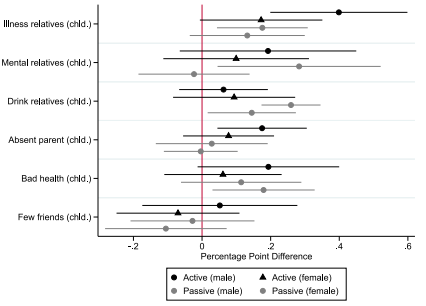
(a) Emotional closeness



(b) Adverse environments

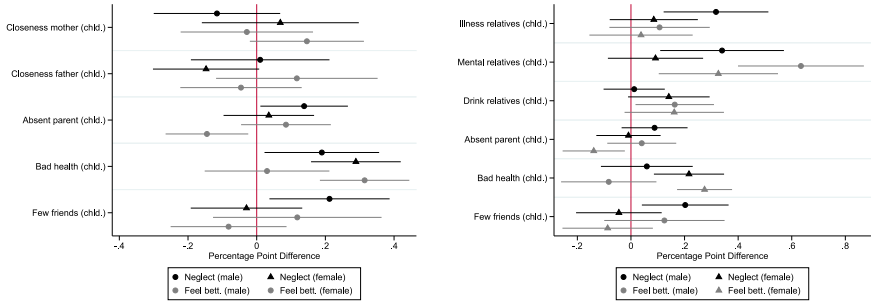


(c) Emotional closeness



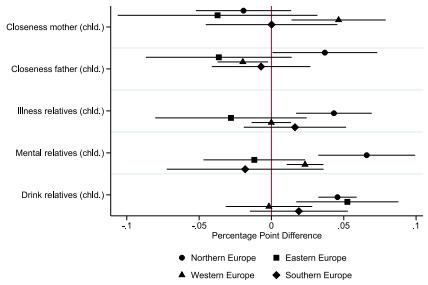
(d) Adverse environments

Fig. 10 Heterogeneous effects of adverse childhood conditions on SNS, IMT and active and passive use of social media, by gender. (**a**) Emotional closeness (**b**) Adverse environments (**c**) Emotional closeness (**d**) Adverse environments. The method of estimation is Logit. The figure depicts marginal effects (expressed as a percentage point difference). All models include: household size, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health, network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). In all models we control for country fixed effects. Standard errors are clustered at the country of residence level

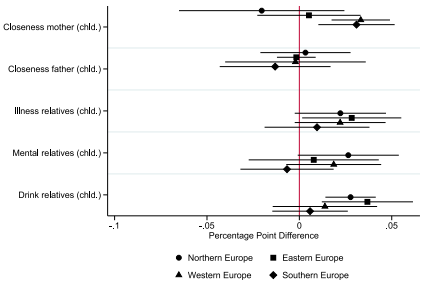


(a) Emotional closeness (b) Adverse environments

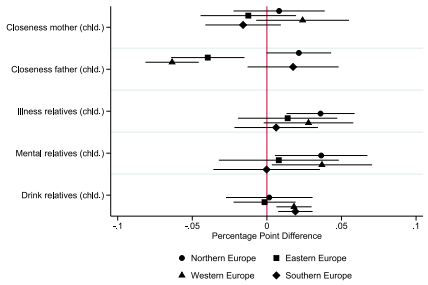
Fig. 11 Heterogeneous effects of adverse childhood conditions on work and family duties neglect and use of social media in order to feel better, by gender. (**a**) Emotional closeness (**b**) Adverse environments. The method of estimation is Logit. The figure depicts marginal effects (expressed as a percentage point difference). All models include: household size, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health, network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). In all models we control for country fixed effects. Standard errors clustered at the country level are reported in parentheses



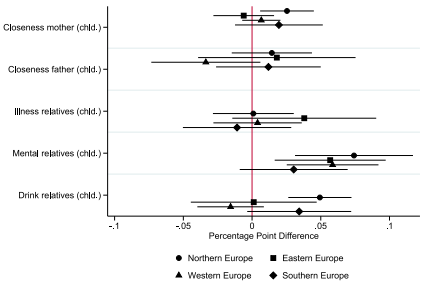
(a) Social networking sites



(b) Passive use of SM

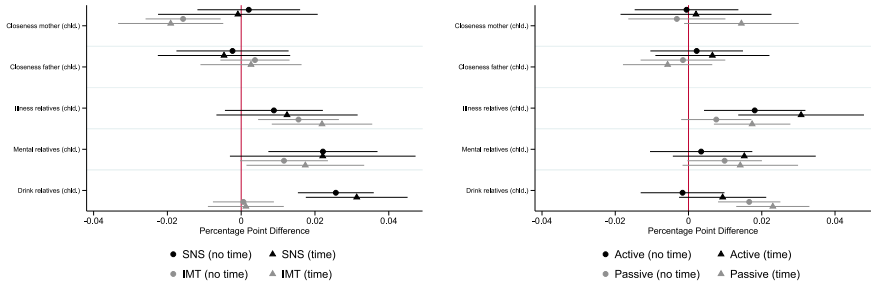


(c) Neglect work/family



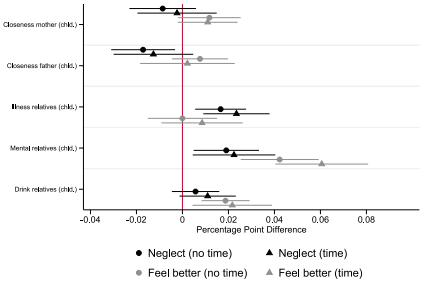
(d) Feel better

Fig. 12 Heterogeneous effects of adverse childhood conditions on SNS, passive use of social media and neglect/mood improvement, by macro region. **(a)** Social networking sites (**b**) Passive use of SM (**c**) Neglect work/family (**d**) Feel better. The method of estimation is Logit. The figure depicts marginal effects (expressed as a percentage point difference). Macro regions: Northern Europe (Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Sweden), Eastern Europe (Bulgaria, Czechia, Hungary, Poland, Romania, Slovakia), Western Europe (Austria, Belgium, France, Germany, Luxembourg, Netherlands), Southern Europe (Croatia, Cyprus, Greece, Italy, Malta, Portugal, Slovenia, Spain). All models include: household size, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, employment status, and self-reported health, network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). In all models we control for country fixed effects. Standard errors are clustered at the country of residence level



(a) SNS and IMT

(b) Active and passive users



(c) Neglect and mood

Fig. 13 Comparison of the coefficients of ACE from models controlling for chronometric effects (triangles) and those not considering chronometric effects (circles). (**a**) SNS and IMT (**b**) Active and passive users (**c**) Neglect and mood. The method of estimation is Logit. The figure depicts marginal effects (expressed as a percentage point difference). Socio-economic controls: household size, religiosity, immigration status (first-generation immigrant), risky health behaviours (smoking, physical inactivity, poor dietary habits), relationship status, number of kids, employment status, and self-reported health. Network, social activities and loneliness include: network size (family and friends), frequency of face-to-face contacts with friends and family members, loneliness (UCLA scale). DK/PNS stands for Don't know or prefer not to say answer options to the question on sexual orientation. In all models we control for country fixed effects. Standard errors are clustered at the country of residence level

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